federal register

Monday
January 5, 1981

Part V

Environmental Protection Agency

Volatile Organic Compounds (VOC) Fugitive Emission Sources in the Synthetic Organic Chemicals Manufacturing Industry and Benzene Fugitive Emissions in the Petroleum Refining and Chemical Manufacturing Industries

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD-FRL 1635-6]

Standards of Performance for New Stationary Sources; VOC Fugitive Emission Sources; Synthetic Organic Chemicals Manufacturing Industry

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule and notice of public hearing.

SUMMARY: The proposed standards would limit emissions of volatile organic compounds (VOC) from fugitive emission sources in the synthetic organic chemicals manufacturing industry (SOCMI). SOCMI is a portion of the organic chemical industry which produces the group of chemicals listed in Appendix E. These proposed standards would (1) require a leak detection and repair program to reduce VOC emissions from valves and (2) specify the use of certain equipment to reduce VOC emissions from pumps, compressors, sampling connections, and open-ended lines. the proposed standards would also prohibit leaks from safety/relief valves during normal operations. The standards would apply only to equipment that contains 10 percent or more VOC. Reference Method 21 and Appendix E are being proposed with the standards.

The proposed standards implement the Clean Air Act and are based on the Administrator's determination that fugitive emission sources of VOC in SOCMI contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. As required by Section 111 of the Clean Air Act, the proposed standards are intended to require new, modified, and reconstructed sources in SOCMI to use the best demonstrated system of continuous emission reduction, considering costs, nonair quality health and environmental impacts, and energy requirements.

A public hearing will be held to provide interested persons an opportunity for oral presentation of data, views, or arguments concerning the proposed standards.

DATES: *Comments.* comments must be received by April 6, 1981.

Public Hearing. A public hearing will be held on March 3, 1981, beginning at 9 a.m.

Request to Speak at Hearing. Persons wishing to present oral testimony should contact EPA by March 24, 1981.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate if possible) to: Central Docket Section (A-130), Attention: Docket No. A-79-32, U.S. Environmental Protection Agency, 401 M Street S.W., Washington, D.C. 20460.

Public Hearing. The public hearing will be held at the EPA Administration Bldg. Auditorium Research Triangle Park North Carolina.

Persons wishing to present oral testimony should notify Ms. Naomi Durkee, Emissions Standards & Engineering Branch (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5271.

Background Information Document. The Background Information Document (BID) for the proposed standards may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, North Carolina 27711, telephone number (919) 541-2777. Please refer to *VOC Fugitive Emissions in the Synthetic Organic Chemicals Manufacturing Industry—Background Information For Proposed Standards,* EPA-450/3-80-033a.

Docket. Docket No. A-79-32, containing supporting information used in developing the proposed standards, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Ms. Susan Wyatt, Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5477.

SUPPLEMENTARY INFORMATION:

Proposed Standards

The proposed standards of performance would apply to fugitive emission sources within process units operated to produce one or more of the organic chemicals listed in proposed Appendix E. Certain equipment processing VOC liquids and gases would be covered by the standards. Implementation of the proposed standards would reduce fugitive emissions of VOC from pumps, compressors, valves, sampling connections, safety/relief valves, and open-ended valves in VOC service. The proposed standards would require: (1) a leak detection and repair program for in-line valves in gas and light liquid VOC service; (2) certain equipment for certain fugitive emission sources in VOC service; and (3) no detectable VOC emissions from safety/relief valves in VOC service during normal operation. VOC service means that a fugitive emission source contains or contacts a process fluid composed of equal to or greater than 10 percent VOC by weight. In addition, the proposed standards would provide a procedure for determining the equivalency of alternative control measures.

The proposed standards include a leak detection and repair program that would require monthly monitoring for valves in gas and light liquid service. Valves found not to leak for two successive months could be monitored quarterly. Monitoring would be conducted in accordance with Reference Method 21 which is being proposed with these proposed standards. The proposed standards would require repair of leaking valves within 15 days after detection of the leak unless repair would require a process unit shutdown. A Leak is defined as a detectable VOC concentration equal to or greater than 10,000 parts per million by volume (ppmv). An initial attempt at repairing these valves would be required within 5 days after detection of a leak.

Two alternative standards have been provided for valves in gas and light liquid service. A plant owner or operator might elect to comply with one of the alternative standards which would be based on data gathered during one year's monthly monitoring in his affected facility. The first alternative standard would provide an allowable percentage of valves leaking. The second alternative standard would provide for the use of a different leak detection and repair program which would achieve the same level of control as the program designed by EPA.

The proposed standards would require pumps in light liquid service to be equipped with dual mechanical seal systems that include a barrier fluid system. The barrier fluid would be required to be something other than a light liquid or gaseous VOC. Light liquids are defined as VOC liquids with vapor pressures greater than 0.3 kPa at 20°C. Each barrier fluid system would be equipped with a sensor so that failure of the inner and outer seals could be detected. In addition, each barrier fluid system would be operated at a pressure greater than the seal area pressure or would be equipped with a barrier fluid degassing reservoir. The degassing reservoir would be connected, by a closed vent system, to a control device having a VOC control efficiency of at least 95 percent. The proposed standards would also require weekly

visual inspections of the seals on light liquid pumps in order to identify failure of the outer seal. Repair of the pump would be required within 15 days after a seal failure or leak was detected unless repair would require a process unit shutdown. The first attempt at repairing the pump would be required within 5 days after detection of the leak. If a pump could not be equipped with dual mechanical seals and a barrier fluid system, a closed vent system would be required to transport leakage to a control device having a VOC control efficiency of at least 95 percent.

The proposed standards would require compressors to be equipped with seals having a barrier fluid system that prevents leakage of the process fluid to the atmosphere. The barrier fluid would be required to be something other than a light liquid or gaseous VOC. These standards would also require each barrier fluid system either to operate at a pressure greater than the compressor seal area pressure or to be equipped with a barrier fluid degassing reservoir. The degassing reservoir would be connected by a closed vent system to a control device having a VOC control efficiency of at least 95 percent. The proposed standards would require each barrier fluid system to be equipped with a sensor so that seal failures may be detected. When seal failure is detected, repair would be required within 15 days unless repair would require a process unit shutdown. An initial attempt at repair would be required within 5 days. If a compressor could not be equipped with a barrier fluid system, a closed vent system would be required to transport leakage from the seal to an enclosed combustion source or vapor recovery system having a VOC control efficiency of at least 95 percent.

The proposed standards would require that VOC's purged from sampling connections be recycled to the process by a closed sampling loop. Alternatively these VOC's could be collected in a closed collection system for recycle or disposal without VOC emissions to atmosphere *In-situ* sampling systems would be exempt from these requirements.

The proposed standards would require that safety/relief valves have "no detectable emissions" of VOC except in cases of pressure relief. "No detectable emissions" of VOC in this case means 200 ppm or less above the background level as measured by Reference Method 21. After each overpressure relief, the proposed standards would require the safety/relief valves to be returned to a state of no detectable emissions within 5 days.

Open-ended lines would be required to be sealed with a second valve, cap, blind flange or plug except when the open-ended line is in use. If a second valve is used, the valve on the process side would be required to be closed first to avoid trapping VOC between the valves.

Cooling towers, agitator seals, and equipment not in VOC service would not be covered by the proposed standards. Flanges, safety/relief valves in liquid service, equipment operating at subatmospheric pressures and all equipment components in "heavy liquid" VOC service, would be excluded from the routine monitoring requirements of the proposed standards. Heavy liquids are defined as VOC liquids with vapor pressure less than 0.3 kPa at 20°C. However, the proposed standards would require VOC leaks which were visually or otherwise detected from these sources in VOC service to be repaired within 15 days after the leak is confirmed using Reference Method 21.

Compliance with the proposed leak detection and repair program and equipment requirements would be assessed through review of records and reports and by inspection. Each owner/operator would report quarterly the number of leaks found and repaired during the quarter. Each owner/operator would also submit quarterly a signed report stating that all monitoring had been performed in accordance with the standards, all specified equipment had been installed and operated in accordance with the standards, and all emission limits had been met.

Under the proposed standards, any owner or operator of a facility subject to the standards could request that the Administrator determine the equivalence of any alternative means of emission limitation to the equipment, design, operational, and work practice requirements of the proposed standards. Upon receiving a request for determination of equivalence, the Administrator would provide an opportunity for public hearing. After such a hearing, the Administrator would make a decision and publish the decision in the **Federal Register.**

Summary of Environmental, Energy, and Economic Impacts

The proposed standards of performance would reduce fugitive emissions of VOC from new and modified process units in SOCMI by approximately 87 percent in comparison to those emissions that would result in the absence of the proposed standards. In the fifth year after implementation the proposed standards would reduce the total uncontrolled fugitive emissions from new, reconstructed and modified process units from approximately 200 to 26 gigagrams (Gg).

The proposed standards of performance would not increase the energy usage of SOCMI process units. In general, the controls required by the standards do not require much energy. Furthermore, the effect of the standards would be to increase efficiency of raw material usage, so that a net positive energy impact would result. Implementation of the proposed standards could result in a minor negative contribution to solid waste. However, the standards would also cause a positive impact on water quality by containment of potential liquid leaks.

The economic impact of the proposed standards would be reasonable. The proposed standards would require of the producers of SOCMI chemicals a capital investment ranging from $41 million in 1981 to $52 million in 1985. The total industry-wide capital investment over the five-year period would be approximately $232 million. The industry-wide net annualized cost would range from about $2 million in 1981 to about $11 million in 1985. This net annualized cost includes a credit resulting from "recovered" fugitive emissions. The costs would be distributed among 830 facilities affected during the five year period. Industry-wide price increases are not expected to result from implementation of these standards.

Rationale

Selection of Sources and Pollutants

The synthetic organic chemical manufacturing industry (SOCMI) source category ranked first on the Priority List, 40 CFR 60.16 (44 FR 49222, August 21, 1979), of 59 major source categories for which standards of performance are to be promulgated by 1982. The Priority List consists of categories of air pollution sources that, in the judgment of the Administrator, cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare.

The segment of the organic chemical industry covered by the proposed standards should be a readily identifiable portion or subgroup of the organic chemical industry. EPA has identified a list of organic chemicals produced in a segment of this industry. The products of this industry segment are derived from about ten basic petrochemical feedstocks and are used as feedstocks in a number of synthetic products industries. Organic chemicals such as acetone, methyl methacrylate,

toluene, and glycine are produced in this segment of SOCMI. Large quantities of SOCMI products are used in the production of plastics, fibers, surfactants, pharmaceuticals, synthetic rubber, dyes, pesticides, and specialty organics. They are typically intermediates, although they may be used as final products. Many of these products are high volume chemicals. The Administrator is proposing the list of organic chemicals in Appendix E as the segment of SOCMI covered by the proposed standards.

The total VOC emissions from SOCMI were estimated to be about 1,000 Gigagrams/year (Gg/yr) in 1976 or about 5 percent of the 19,000 Gg total annual VOC emissions from stationary sources in this country. Fugitive emissions of VOC are a significant portion of the total VOC emissions from SOCMI. Fugitive emissions of VOC from smaller SOCMI process units are about 70 Mg/yr and larger SOCMI process units are about 800 Mg/yr. It is estimated that approximately 400 Gg/yr of the total emissions of VOC from SOCMI are currently attributable to fugitive emission sources. Fugitive emissions are unintentional emissions caused by leaks in processing equipment. Fugitive emission sources include pumps, valves, compressors, flanges, and agitators. Other potential sources of VOC emissions in this industry include process sources, storage and handling equipment sources, and secondary emission sources. Standards are currently under development for some of these VOC emission sources. Other pollutants emitted from SOCMI include particulate matter, carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SO_x), sulfuric acid (H_2SO_4) and hydrochloric acid (HCl) as well as other chemicals. Most particulate matter, NO_x and (SO_x) emissions from this industry are regulated under combustion and process standards that have been developed or are under development.

VOC emissions from SOCMI contribute to the production of ozone which is one of the criteria pollutants for which an ambient air quality standard exists under Section 109 of the Clean Air Act. Because fugitive emissions of VOC are a significant portion of the total SOCMI emissions of VOC, the Administrator is proposing standards of performance that are intended to reduce fugitive emissions of VOC from SOCMI. These proposed standards would reduce emissions of VOC by about 175 Gg/yr in 1985. The VOC that would be regulated by the proposed fugitive emissions standards are compounds which participate in atmospheric photochemical reactions or can be measured by Reference Method 21 which is being proposed with the standards. In addition to reducing fugitive emissions of VOC from SOCMI, the proposed standards would reduce emissions of organic chemicals that are toxic and in some cases potentially carcinogenic. However, specific VOC which the Administrator lists as hazardous air pollutants would be regulated under Section 112 of the Clean Air Act rather than under this regulation.

Selection of Regulatory Approach and Affected Facilities

Two general regulatory approaches could be used in developing standards for SOCMI. The first approach involves the development of standards applicable to each specific chemical process; this approach has historically been the most commonly used approach in developing standards of performance for new stationary sources. Following this approach would involve establishing standards for each specific chemical process.

The second approach involves the development of standards on the basis of similar types of emission sources and applicable emission control techniques. The second approach is more resource efficient than the first approach because a large number of specific chemical processes can be covered by one regulation.

SOCMI plants contain similar fugitive emission sources. In general, a few fugitive emission sources within SOCMI process plants contribute the greatest proportion of fugitive emissions. Leaks from fugitive emission sources generally occur randomly and are not related to process variables. These similarities in the behavior of fugitive emission sources in SOCMI allow the same control techniques to be applied to all of the processes. Therefore, because the control techniques can be applied to the entire industry group and because regulating the entire group would be more resource efficient, a single regulation is being proposed for controlling fugitive emissions from SOCMI.

An affected facility for standards of performance is an emission source or group of emission sources to which the standard applies. Affected facilities for fugitive emissions standards could be defined as individual emission sources (equipment components), groups of equipment components that are operated in conjunction with each other (process units), or groups of process units at one location (plant sites). The selection of one of these definitions for affected facilities is influenced by the fact that the provisions of the proposed standards would apply to new, modified or reconstructed facilities.

An existing facility, as defined in 40 CFR 60.2, is a facility that was constructed or modified before the proposal date of the applicable standards of performance. However, an existing facility that is modified or reconstructed after the date of proposal of the standards becomes an affected facility and then is subject to applicable standards of performance.

Modification is defined in 40 CFR 60.14(a) as any physical or operational change of an existing facility which increases the emission rate of any pollutant to which a standard applies. Exemptions to this definition include an increase in production rate, if such an increase can be made without capital expenditure; an increase in the hours of operation; the use of an alternative fuel or raw material if the facility was designed to accommodate the alternate fuel or raw material prior to the standards; the addition of air pollution control equipment; routine maintenance, repair, and replacement; and relocation or change in ownership.

Reconstruction is defined in 40 CFR 60.15 as any replacement of components in an existing facility where the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility. Under such conditions, the Administrator would determine whether an existing facility would become an affected facility. Fixed capital cost means the capital needed to provide all depreciable components of the facility.

The three different alternatives for defining affected facilities and the implications of each one were considered in selecting the definition. If the affected facilities covered by the proposed standards were defined on the basis of individual equipment components, any replacement of an equipment component (pump, valve, etc.) would be considered a new source and would be subject to the new source standards. Under this definition situations would result in which replaced equipment components in existing process units would be subject to new source standards, while adjacent components would not be subject to the standards. Determining which components were subject to requirements of the standards could be difficult for the owner/operator and for EPA.

Designating affected facilities on the basis of process units would combine individual fugitive emission sources

within the process unit into a unified group. Any like-for-like replacement of fugitive emission sources within an existing unit would not increase the overall emission rate, and would be a small capital expenditure compared to the cost of the entire unit. Therefore, the unit would not be subject to the standards due to modification or reconstruction considerations. Defining an affected facility as a process unit would reflect industry construction practices. Almost all new construction in SOCMI is by process unit. Furthermore, most reconstruction and modification occurs by process units.

Affected facilities could also be defined as plant sites, i.e., all process units at each plant site. If affected facilities were defined as plant sites, construction of new process units at existing sites could make the entire site subject to the standards. This broad coverage would be an unreasonable burden for owner/operators that have existing plant sites that may consist of many process units. The burden could be so severe that expansion might be limited at existing sites. If an entire process unit were replaced within an existing plant site, no emission increase would result, and, therefore, the unit and site would not be subject to the standards under modification considerations. If the plant site consisted of many process units, the replacement of one unit would probably not exceed 50 percent of the replacement cost of the affected facility (all process units at the site), and therefore the unit and site would not be subject to the standards.

After carefully considering each of the above alternatives, the Administrator selected process units as the basis for defining affected facilities. This definition allows for routine equipment replacement and minor changes or expansions in existing facilities without subjecting either single emission sources or entire plant sites to requirements of the proposed standards while also providing for full coverage for all new process units.

A disadvantage of implementing a decision to designate the process unit as the affected facility is that some small, routine changes and additions in an existing SOCMI unit could result in the unit's being modified and, therefore, subject to the standards of performance. These changes and additions may increase the number of fugitive emission sources within an existing facility, thereby increasing the fugitive emissions by a small amount. In most cases it would be feasible to control fugitive emissions from some other fugitive emission sources within the existing facility to keep fugitive emissions to their original level. In cases where existing facilities are already operating with a good fugitive emission control program, however, it might not be possible to control fugitive emissions from another fugitive emission source.

Standards of performance for new SOCMI sources are not intended to cover existing plants making routine and minor additions. There are two exceptions to the modifications provisions in the General Provisions of 40 CFR Part 60 which may exclude some plants making such additions. Exemptions are made for routine replacement and for additions made to increase production rate if they can be accomplished without capital expenditures. There are many specific reasons for routine additions and changes made in a SOCMI unit. For example, a small number of fugitive emission sources might be added in making changes to increase productivity, to increase ease of maintenance, to improve plant safety, and to correct minor design flaws. While the two reasons for exemptions included in the General Provisions might be interpreted to cover these types of changes, there may be different interpretations. To clarify the intent that existing SOCMI units making routine changes and additions would not be covered, the proposed standards would exempt additions made for process improvements if they are made without incurring a "capital expenditure" as defined in the General Provisions.

The General Provisions define "capital expenditure" as an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable "annual asset guideline repair allowance percentage" specified in the latest edition of Internal Revenue Service Publication 534 and the existing facility's basis, as defined by Section 1012 of the Internal Revenue Code. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any "excluded addition" as defined in IRS Publication 534, as would be done for tax purposes.

Using the process unit as the basis for an affected facility, an affected facility would be a group of all fugitive emission sources within a process unit. In this way, the process unit is used as the basis for defining an affected facility, but coverage is restricted to fugitive emission sources. A process unit is specifically defined as equipment assembled to produce one or more of the chemicals listed in proposed Appendix E which can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the final product. A process unit includes intermediate storage or surge tanks and all fluid transport equipment connecting the reaction, separation and purification devices. All equipment within the battery limits is included. However, offsite fluid transport and storage facilities are excluded. Under this definition, if a number of SOCMI process units were integrated into a continuous operation, each would be considered a separate process unit. For example, if chemical A was produced as a feedstock for the production of chemical B and chemical B, in turn, was used as a feedstock to produce chemical C, the whole continuous operation would consist of three process units. If A, B, and C were SOCMI chemicals, there would be three affected facilities.

Selection of Regulatory Alternatives

Fugitive emissions of VOC can be reduced by two types of control techniques: (1) leak detection and repair programs and (2) equipment, design, and operational specifications. Four regulatory alternatives which would achieve different levels of emission reduction using various combinations of leak detection and repair programs and equipment, design, and operational requirements were considered.

Control Techniques. The leak detection and repair programs included in the various regulatory alternatives consist of two phases. The initial phase involves monitoring potential fugitive emission sources within a process unit to detect fugitive emissions of VOC. After detection of the leak, the second phase involves repair or replacement of the fugitive emission source.

Several leak detection methods were considered in the development of the regulatory alternatives. Methods considered included the use of VOC detection instruments and soap bubble solutions to locate individual leaking sources. Different modes of monitoring were also considered. Included were periodic monitoring for fugitive emission leaking sources on an individual component or an area basis and continuous automatic instrument monitoring of ambient air at multiple sites within a facility. As detailed in the Selection of Test Methods section of this preamble, the individual component survey using a portable VOC detection instrument has been selected as the leak detection method for the proposed standards. This method requires that the VOC concentration at the surface of each fugitive emission source would be

monitored with a portable VOC detection instrument.

The effectiveness of an individual source leak detection program would depend not only on the detection method, but also on the frequency of the monitoring schedule. More frequent monitoring would allow leaks to be detected earlier and thus allow more frequent maintenance and a corresponding reduction in fugitive emissions.

The second phase of a leak detection and repair program consists of repair or replacement of leaking fugitive emission sources. Repair or replacement of a fugitive emission source would be required within a specified period of time after the detection of a VOC concentration equal to or in excess of a predetermined level. These repair and replacement procedures would vary for each fugitive emission source. Fugitive emissions from packed seals on a pump or compressor, for example, could be reduced by tightening the packing gland. However, the packing could deteriorate to a point where further tightening would no longer reduce, but instead, would increase the emission rate. At this point, the packing would have to be replaced. Mechanical seals on pumps and compressors would need to be removed for repair. Replacement of these seals would be included in their repair, if necessary.

Many valve leaks can be repaired while the equipment is in service. Most process valves have a packing gland which could be tightened while the valve is in service. Tightening of the packing gland would normally reduce fugitive emissions from a leaking valve, but the emission rate could increase if the packing is old and brittle or if the packing were overly tightened. When this orrurs, the packing would have to be replaced. Plug valves might be repaired by addition of grease.

Some valves could not be repaired while in service. These valves include control valves, which may be excluded from in-service repair by operating or safety considerations, and block valves, whose removal for repair or replacement might require a process shutdown. Other valves, such as control valves with a manual bypass loop, could be isolated for repair or removal. The repair of a leaking safety/relief valve normally requires that it be removed from service.

Leaks from flanges could often be reduced by tightening of the flange bolts. Most flanges could not be isolated from the process to permit replacement of the gasket.

Fugitive emissions of VOC also could be reduced by installing certain equipment. Requiring installation of certain equipment was considered for the following fugitive emission sources in the development of the regulatory alternatives: pumps, compressors, pressure relief devices, open-ended lines, sampling connections, and valves.

Fugitive emissions from pumps occur primarily at the pump seal. These emissions could be reduced by installation of the following equipment: sealless pumps, pumps with improved seals (e.g., dual mechanical seals), or closed vent systems for collection and control of emissions.

Because of process condition limitations, sealless pumps are not suitable for all pump applications but would reduce emissions whenever applicable. Enclosing the seal area and venting the captured emissions to a control device is an alternative control technique for pumps; however, it is not generally used because such a system is costly.

Dual mechanical seals are currently used in many SOCMI process applications. These seals characteristically include a barrier fluid between the seals. If the pressure in the barrier fluid system is higher than that in the pump seal area, VOC would not leak from the seal. If, however, the pressure in the pump seal area is higher, VOC could leak into the barrier fluid and later be emitted to the atmosphere through degassing vents on the barrier fluid reservoir. Connecting the degassing vents to a control device (enclosed combustion or vapor recovery system) could effectively control fugitive emissions originating from the double mechanical seals. The control efficiency would vary with the condition of the mechanical seals and the type of control device used, but control efficiencies approaching 100 percent can be achieved. Consequently, a system combining dual mechanical seal systems equipped with controlled degassing vents were considered as the equipment for pumps.

Emissions from compressors also occur primarily at the seal. An enclosed seal area or replacement of the seal with an improved seal (mechanical) could be specified to reduce emissions from compressors. Enclosing the seal area and venting the captured emissions to a control device is an alternative control technique for compressors; however, it is not generally used because it is too costly. The use of mechanical seals on compressors and connection of the barrier fluid reservoir to a control device (enclosed combustion or vapor recovery system) with a closed vent system could provide control efficiencies approaching 100 percent. If the barrier fluid pressure is higher than the compressor seal area pressure, there would be no VOC emissions to atmosphere. However, if the pressure in the barrier fluid system is lower than that in the compressor seal area, the degassing vents on the barrier fluid reservoir should be connected to a control device to effectively control fugitive emissions. Therefore, a system combining mechanical seals and controlled degassing vents was considered as the equipment for compressors.

Safety/relief valves may emit fugitive VOC due to defects in valve seating surfaces, improper reseating after relieving, or process operation near the relief valve set point. Equipment considered for controlling fugitive VOC emissions from relief valves include closed vent systems connected to a control device or rupture disks upstream of safety/relief valves.

A closed vent system can be used to transport the relief valve discharge (and fugitive emissions) to a control device such as a flare. These types of systems are currently used in SOCMI process units; however, under certain applications, such as flaring halogenated compounds, these systems could result in undersirable emissions. The control efficiency of a closed vent and control device system is mostly dependent on the effectiveness of the control device. For example, a closed vent system is about 100 percent effective in VOC capture, and a typical flare process is about 60 to 99 percent effective for VOC destruction; thus, the overall efficiency would be about 60 to 99 percent, depending on the turn-down capability of the flare.

Rupture disks can be installed upstream of safety-relief valves to prevent the emission of VOC through the valve seat during normal processing conditions. The use of a rupture disk upstream of a safety/relief valve results in no emissions of VOC from the valve. Rupture disks would provide more control than systems vented to a control device because the control device could not achieve 100 percent VOC emissions reduction, whereas rupture disks could. Consequently, rupture disks were considered as the equipment for safety/relief valves.

When process samples are taken for analysis, obtaining a representative stream sample requires purging some process fluid through the sample connection. This sample purge could be vented to the atmosphere if the fluid were gaseous, and liquid sample purges could be drained onto the ground or into open collection systems where evaporative emissions could result. There is no leakage from in-site sampling systems but they may not be

applicable in all situations. Fugitive emissions from other sampling connections can be reduced by using a closed-loop sampling system that eliminates atmospheric purging of process material.

Fugitive emissions of VOC from open-ended lines can be controlled by installing a cap, plug, blind flange, or second valve on the open end of the line. Capping of open-ended lines and closed-loop sampling are common industrial practices applied in SOCMI which exhibit control efficiencies for fugitive emissions of VOC of approximately 100 percent. The actual control efficiencies will depend on site-specific factors. Because the equipment is readily available, commonly used, and inexpensive, caps, plugs, blinds, or valves were considered for open-ended lines, and closed-loop sampling was considered for sampling connections.

Fugitive emissions from valves occur at the stem or gland area of the valve body. These emissions can be controlled by using valves which have actuating mechanisms isolated from the process fluid such as diaphragm or bellows valves. Although the control effectiveness of diaphragm or bellows seal valves is about 100 percent, their use is limited. Because the application of these valves would be limited to certain services, they were not considered and, therefore, no equipment was considered for valves in the regulatory alternatives.

Regulatory Alternatives. Four regulatory alternatives, which represent different levels of emission reduction achievable by combining various leak detection and repair programs, operational and design requirements and equipment specifications, were considered in the development of the proposed standards. Regulatory Alternative I is the baseline alternative and represents the level of control that would exist in the absence of any standards of performance. Under Regulatory Alternative I SOCMI facilities located in areas attaining the National Ambient Air Quality Standard for ozone would not be subject to any VOC fugitive emission regulations; however, facilities in nonattainment areas would be subject to applicable SIP regulations. Only a few states have developed or are considering near-term development of these specific regulations. Under Regulatory Alternative I fugitive emissions of VOC could also be controlled to some extent by OSHA health standards or controls based on provisions of insurance policy for fire and/or explosion protection. Estimates of emissions from fugitive emission sources have been developed based on existing levels of fugitive emission control. Thus, Regulatory Alternative I was based on current levels of control, considering possible new regulatory controls, and represents the level of control that would exist in the absence of any standards of performance.

Regulatory Alternative II includes the same monitoring requirements and equipment specifications included in the petroleum refinery Control Techniques Guidelines (CTG) document (EPA–450/2–78–036). These requirements and specifications are:

1. Quarterly monitoring of all in-line valves, open-ended valves and safety/relief valves in gas service (relief valves would also be monitored after overpressure relief to check for proper reseating);
2. Annual monitoring of all in-line valves and open-ended valves in light liquid service;
3. Quarterly monitoring of compressor seals;
4. Annual monitoring of light liquid service pumps (such pumps would also be inspected visually for liquid leaks each week; immediate instrument monitoring of visually leaking pumps would be required); and
5. Installation of caps, blinds, plugs, or second valves to seal all open-ended lines.

Regulatory Alternative III specifies a more frequent equipment monitoring schedule than Regulatory Alternative II, thereby providing for more stringent control of fugitive emissions of VOC. For instance, Regulatory Alternative III would require monthly, rather than quarterly or annual monitoring. Monthly monitoring would result in a reduction of emissions from residual leaking sources, i.e., those sources which are found to be leaking and are repaired but begin to leak again before the next inspection and those previously non-leaking sources that begin leaking between inspections. Regulatory Alternative III would also require the use of caps, plugs, or second valves on open-ended lines.

Of the four alternatives, Regulatory Alternative IV would provide the greatest level of control for fugitive emissions of VOC through the use of equipment specifications for some fugitive emission sources. The implementation of equipment specifications for the various potential fugitive emission sources would lessen the need for periodic monitoring. The monitoring and equipment specifications requirements of Regulatory Alternative IV are:

1. Monthly monitoring of all in-line valves and open-ended valves in gas and light liquid service;
2. Installation of rupture disks upstream of as service safety/relief valves that vent to the atmosphere (the disk would be replaced if disk failure were detected);
3. Installation of closed vents and control devices for compressor seal areas and/or degassing vents from compressor barrier fluid reservoirs;
4. Installation of dual mechanical seals on pumps in light liquid service and installation of closed vent control devices for degassing vents from barrier fluid reservoirs of all pumps in light liquid service (weekly visual inspections of pumps in light liquid service would also be required, with subsequent instrument monitoring required for those pumps with visible liquid leaks);
5. Installation of closed loop sampling systems; and
6. Installation of caps, blinds, plugs, or second valves to seal all open-ended lines.

Selection of Basis for the Proposed Standard

The Clean Air Act requires that standards for performance be based on the best system of continuous emissions reduction, considering costs, energy usage, and environmental impact. Selection of a regulatory alternative as the basis for the proposed standards was made after considering estimated fugitive emission reductions, energy savings or usage, and cost and economic impacts of the regulatory alternatives. SOCMI, with approximately 1,680 operating process units in the United States in 1980, is projected to grow at an annual rate of 5.9 percent. Based on this growth rate, approximately 2,240 process units will be in operation in 1985. Approximately 830 of these facilities would be subject to the proposed standards in 1985 due to new construction. Of this total, about 560 facilities would be newly constructed and subject to the standards on this basis. The remaining 270 facilities would result from replaced facilities which would be subject to the standards.

To examine the environmental impacts of the regulatory alternatives, estimates of fugitive emissions of VOC are required. To make these estimates for SOCMI, fugitive emissions data developed in petroleum refineries have been used. Transferring data in this way is justified because the fugitive emission sources and the substances processed in the two industries are similar. Both industries use the same types of pumps, compressors, valves, flanges and other chemical processing equipment.

Furthermore, both industries process VOC. Leak rates of VOC from similar fugitive emission sources are similar; leak frequencies in the two industries are similar. Available EPA data as presented in the Background Information Document shows this to be true. To further verify this similarity, EPA is currently gathering more data in SOCMI units for comparison to the refinery data. These data will be in the docket before the end of the comment period. These data and comments on this data will be fully considered before promulgation of these standards.

Regulatory Alternative II would reduce fugitive emissions of VOC from the 830 affected facilities in 1985 from an uncontrolled level of 200 Gg/yr to approximately 73 Gg/yr, or by 63 percent. The total energy associated with a VOC being processed is made up of the energy value of the compound and the energy expended to process (condense, pump, vaporize, etc.) the compound. The total energy associated with the VOC would be lost if the VOC were to leak to the atmosphere. This energy loss could be reduced if the VOC were combusted in an enclosed combustion system because some of the energy released during combustion could be recovered. If the VOC could be kept within the process and sold as product, the energy loss would be eliminated. Regulatory Alternative II reduces the energy loss that would result in the absence of any standards.

During the first five years after implementation of Regulatory Alternative II, SOCMI's cumulative capital costs would be $21 million. In the firth year, Regulatory Alternative II would result in an annualized net credit of $29 million due to the value of the recovered product. Implementation of Regulatory Alternative II would tend to hold individual price increases down because it would result in a net annualized credit. Implementation of Regulatory Alternative II could have a slight positive impact on wastewater from SOCMI facilities because leak detection would result in the identification and repair of liquid VOC leaks, and therefore, reduction of VOC's in wastewater from SOCMI facilities. Regulatory Alternative II would have no impact on any solid wastes associated with SOCMI.

Regulatory Alternative III would result in a fugitive emission rate of approximately 62 Gg/yr from the 830 affected facilities in 1985; this represents a 69 percent reduction over the baseline, or Regulatory Alternative I level. Regulatory Alternative III, like Regulatory Alternative II, reduces the energy loss that would result from SOCMI in the absence of any standards. SOCMI would incur cumulative capital costs of $21 million during the first five years after implementation of this alternative. However, due to the increased cost of implementing a more frequent monitoring schedule, Regulatory Alternative III would result in a smaller annualized net credit than Regulatory Alternative II. Implementation of Regulatory Alternative III would result in an annualized net credit of $21 million in 1985. As with Regulatory Alternative II, an annualized net credit would tend to hold individual price increases down. Regulatory Alternative III would have the same potential positive impact on wastewater from SOCMI facilities as Regulatory Alternative II, and no impact on solid waste.

Regulatory Alternative IV would reduce fugitive emissions of VOC from the 830 affected facilities in 1985 to 26 Gg/yr; this represents an 87 percent reduction from the Regulatory Alternative I level. Regulatory Alternative IV would minimize the energy loss that would result from SOCMI in the absence of any standards.

For Regulatory Alternative IV the cumulative capital costs would be about $232 million after the first five years of implementation. The net annualized cost for this regulatory alternative would be $11 million in 1985. These costs should not significantly increase the prices of SOCMI products because net annualized costs of control are extremely small (less than 0.03 percent) relative to the value of total industry output. Implementation of Regulatory Alternative IV could have a slight positive impact on wastewater for the same reasons as Regulatory Alternatives II and III. A wastewater containing suspended solids and some solid waste could result from the use of various control processes such as carbon adsorption units with the equipment specifications implemented under this alternative. However, the impact of these waste streams would be slight. Solid waste impact would also be minimal.

The Administrator selects a regulatory alternative as the basis for the proposed standards of performance after considering emission reductions, energy requirements, and cost and economic impacts of the regulatory alternative. This selection is based on choosing the best system of continuous emission reduction considering costs, energy and environmental impacts. Regulatory Alternative IV would reduce fugitive emissions of VOC by 170 Gg/yr in 1985. Of all the regulatory alternatives, Regulatory Alternative IV would achieve the greatest reduction of VOC fugitive emissions. The costs and economic impacts of Regulatory Alternative IV, as presented above, are reasonable. Energy requirements and nonair quality impacts of Regulatory Alternative IV would be similar to those of the other regulatory alternatives. Therefore, Regulatory Alternative IV represents the best system of emission reduction considering cost, energy requirements, and environmental impact and the Administrator selected Regulatory Alternative IV as the basis for the proposed standards.

Selection of Format for the Proposed Standards

Several formats could be used to implement Regulatory Alternative IV. Section 111 of the Clean Air Act requires that standards of performance be prescribed unless, in the judgement of the Adminsitrator, it is not feasible to prescribe or enforce such standards. Section 111(h) defines two conditions under which it is not feasible to prescribe or enforce a performance standard. These conditions are (1) if the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations, or (2) if the pollutants cannot be emitted through a conveyance device. If a standard of performance is not feasible to prescribe or enforce, then the Administrator may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof as provided in Section 111(h).

For most SOCMI fugutive emission sources, it is not feasible to prescribe a performance standard. Except in those cases in which standard can be set at "no detectable emissions", the only way to measure emissions from such SOCMI fugitive emission sources as pumps, pipeline valves, and compressors would be to use a bagging technique for each of the pipeline sources in a process unit. The great number of such sources and their dispersion over large areas would make such a requirement economically impracticable. Therefore, the Administrator has not selected this format in prescribing the proposed standards.

Another approach to prescribing a standard would be to specify a number or percent of fugitive emission sources that would be allowed to leak. This approach would be qualitative. It differs from the performance standard appoach which is based on quantitive emissions measurements (e.g. bagging). However, it would have some of the same benefits

of flexibility provided by performance standards. The only fugitive emission source for which a leak frequency limit would be applicable is valves. However, the variability in the percentage of valves leaking among process units limits the setting of an allowable percentage of valves leaking which could be achieved by all process units within SOCMI. This variability is observed even among units in which leak detection and repair programs are being implemented. Even so, establishing an allowable percentage of valves leaking based on data collected for that unit, may be feasible for each individual process unit. This approach is discussed in more depth in Alternative Standards for Valves in the next section of this preamble as one which would add desirable flexibility to the proposed standard.

Another possible regulatory format is an equipment standard. For those sources for which performance standards cannot feasibly be prescribed, work practices, design standards, operational standards, or equipment standards may be prescribed. Each of these formats has its own advantages and disadvantages. Equipment standards provide well-documented reductions. Compliance monitoring would require only an initial check to insure that the equipment had been installed properly and periodic checks to insure that equipment was continuing to operate properly. However, an inherent disadvantage associated with this type of format is that less site-specific flexibility is provided than with a performance standard and innovation may be stymied. Design and operational standards have similar advantages and disadvantages as those for equipment standards.

Another format is work practices. An example of this format would be a program for detecting and repairing leaks. Inspection methods, inspection time intervals, and time allowed for repair would be defined in detailing the work practices. Compliance with a work practice standard would be determined by judging success in implementing the work practices. Some recordkeeping and reporting would be needed to serve as the basis for judging this success.

The proposed standards could incorporate all of the potential regulatory formats. Different formats are required for different fugitive emission sources because characteristics of the emission sources, the available emission control options, and the applicability of proposed Reference Method 21 differ among the sources. In the next section the rationale for selecting a particular format is explained for each type of fugitive emission source. For each fugitive emission source, the feasibility of prescribing or enforcing a performance standard is discussed. If a performance standard is not feasible, the rational for selecting another format is presented.

Selection of Emission Limit, Equipment, Work Practice, Design and Operational Standards

Safety relief valves. Section 111(h) of the Clean Air Act requires that a standared of performance be promulgated unless it is not feasible to prescribe or enforce. Thus, control techniques included in Regulatory Alternative IV were first evaluated to determine if a performance standard could be proposed. The conclusion of this evaluation is that the only fugitive emission sources for which it would be feasible to prescribe and enforce a performance standard are safety/relief valves, and in certain cases, fugitive emission sources which are designed not to leak.

Rupture disks were evaluated as the equipment specification for gas service service safety/relief valves under Regulatory Alternative IV. When the integrity of rupture disks is maintained, fugitive emissions through the relief valve are eliminated. Rupture disks maintain their integrity unless an overpressure occurs. After an overpressure, replacement of the rupture disk once again eliminates fugitive emissions through the safety relief valve.

For control techniques the eliminate fugitive emissions, and emission limit measurement for "no detectable emissions" is feasible by the proposed Reference Method 21. Measurement methods for determing the quantitative emission rate from safety/relief valves are not feasible because they would require bagging each piece of equipment. However, Method 21, while it does not allow quantitative measurement of emissions, does allow the detection of leaks of fugitive VOC emissions from safety/relief valves. Therefore, the proposed standard for safety/relief valves in gas service is "no detectable emissions." The "no detectable emission" limit would not apply to discharges through the safety/relief valve during pressure relief because the function of relief valves is to discharge process fluid, thereby reducing dangerous high pressures within the equipment. The Standard would specify, however, that the relief valve be returned to a state of no detectable emissions within 5 days after such a discharge. It would further require an annual test to verify the "no detectable emissions" status of the safety relief valves. Also, a test would be required when the Administrator makes such a request.

A test to determine if a fugitive emission source is complying with a "no detectable emissions" requirement is a performance test. Performance tests require three separate runs, unless otherwise specified in an applicable subpart, as required in 40 CFR 60.8(f). A test to determine if a fugitive emission source is complying with a "no detectable emissions" requirement does not require three runs. Thus, tests to determine "no detectable emissions" would be exempted from 40 CFR 60.8(f) in the proposed standards.

In addition to three runs, performance test requirements include a notification to the Administrator 30 days before each performance test. For fugitive emission sources, tests to determine "no detectable emissions" may occur throughout a year and at least, after each over pressure relief. Requiring an owner or operator to notify the Administrator, as required in 40 CFR 60.8(d), is not considered reasonable for these standards. Thus, to reduce the reporting burden on industry, owners or operators of affected facilities are exempted from 40 CFR 60.8(d) in the proposed standards.

Pumps. It is not feasible to prescribe a performance standard for pumps because application of measurement technology to pumps is technologically and economically impractical. First, even though pump seals can be designed to release emissions into a conveyance mechanism, measurement of these emissions is not practicable. Dilution of the fugitive emissions in a conveyance mechanism limits the economical and technological application of measurement methods. Second, determining emission levels from each pump would require the time-consuming, expensive and impractical method of bagging each pump as described in the Selection of Test Method section of this preamble. Furthermore, a "no detectable emission" limit is not feasible because dual mechanical pump seals leak on occasion.

After determining that a performance standard for pumps would not be practicable because of technological and economic limitations, equipment standards were evaluated. Equipment specifications evaluated for pumps were dual mechanical seals with closed vents for the barrier fluid degassing reservoirs, closed vents for the pump seal areas, and sealless pumps. After evaluation, dual mechanical seal systems that include barrier fluid systems and

sensors to detect failure of either seal or barrier fluid system were selected as the basis for the equipment specifications for pumps in Regulatory Alternative IV. They are frequently used in SOCMI pump applications. If the barrier fluid system is maintained at a pressure greater than the stuffing box pressure, no VOC leakage would occur because all leaks would be inward into the process fluid. If the stuffing box pressure is greater than the barrier fluid pressure, the barrier fluid between the two seals collects leakage from the inner seal, and the VOC collected by the barrier fluid is controlled by connecting the barrier fluid reservoir to a control device (enclosed combustion or vapor recovery) with a closed vent system or by returning it to the process. The dual mechanical seals with controlled degassing vents system is the most universally applicable of the three options evaluated. Thus, because they provide the best control efficiency (dependent upon the efficiency of the control device) considering costs, the equipment requirement for pumps is the use of dual mechanical seals with closed barrier fluid degassing vents connected to a control device or designed to return the VOC to the process.

Section 111(h) of the Clean Air Act requires that when equipment standards are established, requirements must also be established to insure the proper operation and maintenance of the equipment. Such provisions have been made in the proposed regulation. An indicator on the barrier fluid system would reveal any catastrophic failure of the inner or outer seal or barrier fluid system. The failure indication criterion would be determined, for each piece of equipment. Leakage through the outer seal could be detected by weekly visual inspections and would be limited by the barrier fluid. Although the intent of the standards would best be preserved by inspections as frequent as possible, weekly inspections were specified to keep the requirement from being burdensome. Detection of any leaks should be followed by repair within 15 days.

The barrier fluid would be either a non-VOC fluid or a heavy-liquid VOC. The use of light liquid VOC as a barrier fluid could result in emissions of VOC of the same magnitude as those which would occur if product VOC were allowed to leak past the seals. Leakage of process fluid through the inner seal would be captured and controlled by the barrier fluid/closed vent system.

Sealless pumps, such as diaphragm or canned pumps, do not have a potential leak area, and therefore should achieve approximately 100 percent control. However, sealless pumps may not be suitable for use in some SOCMI process applications due to throughput, pressure, or fluid composition constraints. Sealless pumps were not selected under Regulatory Alternative IV and, therefore, were not selected as required equipment for the proposed standards.

Sealless pumps are at least equivalent to dual mechanical seals with barrier fluid degassing vents connected to control devices in controlling fugitive emissions. Therefore, the proposed standards allow them for owners/operators who wish to use them. Seallesss pumps would be required to operate under a "no detectable emission" limit as discussed in *Leakless Equipment* in this section.

The seal area of a pump could be completely enclosed, and this enclosed area could be connected to a control device (enclosed combustion or vapor recovery) with a closed vent system. The control efficiency of this arrangement is dependent on the control efficiency of the vapor recovery system or enclosed combustion device. The closed vent system could require a flow inducing device to transport emissions from the seal area to the control device. Because of safety or operating limitations, enclosure of the pump seal area may not be feasible in all cases.

There may be isolated and unusual pump applications which require pumps which cannot be equipped with mechanical seals. For example, if a reciprocating pump is required, mechanical seals may not be possible. The enclosed seal area would be the best control option for such pumps. Therefore, enclosed seal areas connected to a control device with a closed vent system would be allowed for pumps that cannot be equipped with dual mechanical seal systems. Although enclosing seal areas would be as effective in reducing emissions as other effective techniques, this option would most likely be used on a limited basis.

Compressors. As in the case for pumps, a performance standard for compressors is not feasible. Even though compressor seals can be designed to release fugitive emissions into a conveyance mechanism, measurement of these emissions would be limited by technological and economical factors. Measuring emissions from each compressor would require bagging each seal area. This method is time-consuming and expensive and is therefore, impracticable. An emission limit of "no detectable emissions" using proposed Reference Method 21 as the measurement method, is not feasible because mechanical contact seals leak on occasion.

Because performance standards cannot feasibly be prescribed for compressors, the several alternative formats were considered and equipment standards found to be most appropriate. Equipment specifications evaluated for compressors were sealless compressors, mechanical contact seals equipped with barrier fluid system with the barrier fluid degassing reservoirs vented to control devices, and closed vents for the compressor seal area vented to a control device. Dual seal systems that include barrier fluid systems and sensors to detect failure of either seal or barrier fluid system were selected as the basis for Alternative IV. Some compressors in current SOCMI applications have a seal system with a circulating barrier fluid system. This barrier fluid system is similar to the system described for pumps with dual mechanical seals, although the compressor seals may be mechanical contact, oil film, or another type of seal. If the barrier fluid system is maintained at a pressure greater than the stuffing box pressure, no VOC leakage would occur because all leaks would be towards process fluid. If the stuffing box pressure is greater than the barrier fluid pressure, the barrier fluid between the two seals collects leakage from the inner seal. Leakage through the seal results in the presence of VOC in the barrier fluid which would be a non-VOC fluid or gas or a heavy VOC. The use of a light liquid VOC or VOC gas a barrier fluid could result in emissions of VOC of the same magnitude as those which would occur if product VOC were allowed to leak past the seals. VOC trapped in the barrier fluid would be emitted from the barrier fluid reservoir. However, this VOC could be collected and directed to a control device (enclosed combustion or vapor recovery system) or returned to the process (probably the suctions of the compressor) by a closed vent system that is connected to the barrier fluid reservoir. A seal system which uses a barrier fluid system provides a high control efficiency and is the most applicable effective control technique for compressors.

Section 111(h) of the Clean Air Act requires that proper maintenance and operation of equipment specified in a regulation be insured. To provide this insurance the proposed standard requires visual inspection and monitoring of the barrier fluid system to detect seal failure or barrier fluid system failure and the use of non-VOC or heavy VOC liquids for the barrier fluid. The

failure indication criterion would be determined for each piece of equipment.

Although sealless compressors would achieve approximately 100 control, sealless compressors are not readily available in capacities large enough for most SOCMI process applications, and therefore, have limited use in SOCMI. Consequently, sealless compressors were not considered under Regulatory Alternative IV and were not selected as equipment specifications for the proposed standards.

However, sealless compressors are at least equivalent to compressors equipped with barrier fluid systems and degassing vents connected to control devices because VOC emissions are eliminated and, therefore, can be used as an alternative. Leakless compressors would be required to operate under a "no detectable emissions" limit as discussed in the *Leakless Equipment* section.

There are some cases in which seals with barrier fluid systems cannot be utilized. A barrier fluid system cannot be used under all process conditions due to pressure limitations. For those cases, enclosure of the seal area would be the best option. The enclosed area would be connected to a control device (enclosed combustion or vapor recovery) with a closed vent system. Therefore, enclosed seal areas connected to a control device with a closed vent system would be allowed for compressors that cannot utilize a barrier fluid system. Although enclosing seal areas would be as effective in reducing emissions as other effective techniques, this option would most likely be used on a limited basis.

Open-ended valves. The equipment chosen for open-ended valves as the basis for Regulatory Alternative IV was equipment which would effect enclosure of the open end. Because performance standards cannot feasibly be prescribed for open-ended valves, the several alternative formats were considered and equipment standards found to be most appropriate. An emission limit is not feasible because open-ended valves are generally not designed to emit fugitive emissions into a conveyance mechanism and because they would require bagging, which is economically impracticable, as previously explained in the Selection of Formats section. A "no detectable emissions" level could not be selected as the basis for the proposed standard because VOC's could leak through the valve seat and become trapped in the line between the valve and enclosure. These trapped VOC's would be emitted when the enclosure was removed for operation of the valves and open-ended valve.

After consideration and rejection of the possibilities for performance standards for open-ended valves, equipment standard options were considered. Equipment specifications considered included improved valve seat technology and enclosure of the open end. Improved valve seat technology was not selected because the effectiveness of such technology could be nullified by operating variables such as incomplete closure of the valve by operating personnel.

Specific equipment which would be required to close the open end would be a cap, plug, blind flange, or a second valve. The control efficiency associated with these techniques is approximately 100 percent.

To insure the proper operation of the equipment, open-ended lines are also covered by operational standards. If a second valve is used to close the open end, the proposed standards would require the upstream valve to be closed first. After the upstream valve is completely closed, the downstream valve would be closed. This operational requirement is necessary in order to prevent trapping process fluid between the two valves, which could result in a situation equivalent to the uncontrolled open-ended line.

Sampling connections. Closed loop sampling was considered as the equipment specification for sampling connections. Closed loop sampling systems eliminate emissions due to purging by either returning the purge material directly to the process or by collecting the purge in a collection system which is not open to the atmosphere for recycle or disposal. An emission limit was not specified because measuring mass emissions from each sampling system would require bagging each system, a measurement method which is time-consuming, costly, and impractical. A "no detectable emissions" limit is not feasible because although the VOC control efficiency of a closed loop sampling system is approximately 100 percent, some VOC could be emitted during its transfer to a closed collection device or during its ultimate disposal.

Because performance standards cannot feasibly be prescribed for sampling connections, the several alternative formats were considered and equipment standards found to be most appropriate. The equipment standards in the proposed standards require the use of closed loop sampling equipment. In addition to closed loop sampling systems any system that collects all the VOC purged in the sampling and either recycles or disposes of this VOC without emissions to atmosphere is allowed. *In situ* sampling systems are exempted from these requirements.

Valves. Work practices consisting of periodic leak detection and repair programs were considered for valves in Regulatory Alternative IV.

A performance standard for valves was considered and found infeasible. Valves are not designed to release fugitive emissions into a conveyance mechanism. Furthermore, determining mass emissions from each valve would require bagging each valve. This measurement method would be time-consuming and prohibitively expensive, especially considering the number of valves in a SOCMI process unit. A "no detectable emissions" limit is not feasible for valves because some percent of the valves are expected to lead.

Since performance standards were found to be infeasible for valves, equipment standards were considered. Equipment specifications considered for valves were diaphragm valves and bellows-sealed valves. These equipment specifications would not be suitable for all SOCMI process applications, and therefore, were not selected as part of Regulatory Alternative IV. However, use of these valves would be at least equivalent because they eliminate leakage of VOC. The use of such valves is allowed as an alternative. These valves would be required to operate with "no detectable emissions" as described in *Leakless Equipment* in this section.

Work practices were selected as the format for control of fugitive VOC emissions from valves. Several factors influence the level of emission reduction that can be achieved by a leak detection and repair program. The three main factors are the monitoring interval, leak definition, and repair interval. Training and diligence of personnel conducting the program, repair methods attempted, and other site-specific factors may also influence the level of emission reduction achievable; however, these factors are less quantifiable than the three main factors.

The monitoring interval is the frequency at which individual component monitoring is conducted. The length of time between inspections should be determined by the rate at which new leaks occur and the rate at which repaired leaks recur. More frequent inspections could then be required for souces which tend to leak more often. Available data with which to quantify the frequency of occurrence and recurrence of leaks from valves are limited. However, more frequent monitoring would result in greater emissions reduction because more

frequent monitoring would allow leaks to be detected earlier and thus allow more immediate repair.

Monthly monitoring was considered for Regulatory Alternative IV. Test data indicate that leaks would be found with monthly inspections. More frequent intervals were not considered because the large number of valves in certain SOCMI process units limits the practical minimum for the monitoring intervals. For example, a typical large process unit, Model Unit C (defined in the Background Information Document), includes 2800 valves (in gas and light liquid service) requiring periodic monitoring. Each leak detection and repair survey for a single process unit would require approximately 95 man hours for monitoring and 16 man hours for repair. If the monitoring were performed by a two man team more than one week would be required to complete the monitoring. A week would clearly be too short a time interval to select for monitoring. Since some time would be required to schedule repair after a leak is detected, monitoring intervals shorter than one month could result in a situation where a detected leak could not be repaired before the next monitoring was required. One month was selected as the required monitoring interval because it would provide the greatest emission reduction potential without imposing difficulties in implementing the leak detection and repair program.

Industry representatives argued at the National Air Pollution Control Techniques Advisory Committee meeting (a public meeting held during the development of standards of performance) that monitoring all valves monthly would be an inefficient expense of time and manpower for valves that leak infrequently or less often than other valves. The analysis in the BID assumed that about half the valves found leaking at any given time are valves which have been repaired and which have begun leaking again. This assumption emphasizes the importance of valve leak recurrence. If this assumption is correct, more monitoring effort should be expended on valves found leaking and less on those found leaking infrequently. Therefore, the proposed standard would require monthly monitoring of valves unless they are not found leaking for two successive months. If a valve were not found leaking for two successive months, an owner or operator would have the option to exclude that valve from monitoring until the first month of the next quarterly period. Thereafter, the valve could be monitored once every quarter until a leak was detected. If a valve leak were detected, monthly monitoring of that valve would be required until it had been shown leak free for two successive months.

EPA wants to make clear that this proposed standard is based on the assumption that recurrence is an important factor in predicting valve leaks. This assumption was used to develop a monitoring program which would result in a level of fugitive emission control comparable to that which would result from monthly monitoring. It is not EPA's intent in this action to propose a monitoring plan which would be comparable in effect to quarterly monitoring. This would be the case under the proposed standard if occurrence rather than recurrence is the more important factor.

EPA is currently collecting data concerning the importance of valve leak recurrence. The data being collected will be available before promulgation. If the data shows that recurrence is not a significant contributor to the total number of leaks, the proposed program will be reassessed and consideration will be given to returning to monthly monitoring.

The leak definition is the VOC concentration observed during monitoring that defines leaking sources that require repair. Two primary factors affect the selection of the leak definition. These factors are: (1) the percent of total mass emissions which can potentially be controlled by the leak detection/repair program, and (2) the ability to repair the leaking components.

As the leak definition decreases, the maximum potential emission reduction increases due to the increasing number of sources that have VOC concentrations that are greater than the decreasing leak definitions. The overall emission reduction of a leak detection and repair program depends on several factors as noted above. Each of these factors limits the effectiveness of the program. If each of the factors considered in selecting the leak detection and repair program is 90 percent effective, then the overall effectiveness would be about 73 percent. Each factor is a limiting factor to the overall effectiveness. Thus, the most restrictive definition that is reasonable for each factor should be selected. In order to maximize control effectiveness of the leak detection and repair program, the lowest leak definition which is feasible in terms of monitoring and controlling effectively without being unreasonably burdensome should be selected.

The leak definition selected for leak detection monitoring was 10,000 ppm. Preliminary data show that attempting on-line repair of valves at or above a leak definition of 10,000 ppm could result in a few cases where the attempted repair would increase the emission rate from the valve, but these cases do not offset emission reductions achieved by repair of other valves. When repair does not reduce the VOC concentration to less than 10,000 ppm, the valve would require a more extensive repair effort than tightening or regreasing the packing. Replacement of the valve may be necessary. Preliminary data also show that attempting the repair of valves in the 1,000–10,000 ppm range (low level) could result in more cases in which individual valve emission rates increase after repair when compared to the number of such cases which would result from attempting to repair valves in the over 10,000 ppm range. If such increases were to occur, the attempted repair of "low level" leaks could result in a lower overall emission reduction at a leak definition of 1,000 ppm than at 10,000 ppm. Because the 10,000 ppm action level may provide a higher overall emission reduction than the 1,000 ppm action level, 10,000 ppm was selected as the leak definition for leak detection monitoring.

The repair interval is defined as the length of time allowed between the detection of a leak and repair of the leak. In order to provide the maximum effectiveness of the leak detection and repair program, the repair interval should require expeditious reduction of the fugitive emission but should also allow the owner/operator to maintain a reasonable degree of flexibility in overall maintenance scheduling.

The length of the repair interval would affect emission reductions achievable by the leak detection and repair programs because leaking sources would be allowed to continue to leak for a given length of time. Repair intervals of 1, 5, 10, 15, 30 and 45 days were evaluated. The effect on the maximum emission reduction potential is proportional to the number of days the source is allowed to leak between detection and repair. Estimates of emission reduction efficiency as a function of repair interval are presented in the Background Information Document.

The repair interval selected for the leak repair program was 15 days. A repair interval of one day would cause problems in coordinating activities of personnel involved in leak detection and leak repair and in certain circumstances, would not be technically feasible. A one day repair interval would essentially

require repair of each component as soon as the leak was discovered.

Some valves may not be repairable by simple field maintenance. These valves may require spare parts or removal from the process for repair. Repair intervals of 5 and 10 days could cause problems in obtaining acceptable repair for these valves. However, a 15-day interval provides the owner/operator with sufficient time for flexibility in repair scheduling, and provides time for better determination of methods for isolating pieces of leaking equipment for repair. In general, a 15 day repair interval allows more efficient handling of repair tasks while maintaining an effective reduction in fugitive emissions and was, therefore selected as the repair interval. A repair interval of 30 or 45 days was not selected because a 15 day repair interval provides the most effective emission reduction without being burdensome.

However, the first attempt at repair of a leaking source would be required as soon as practicable after detection of the leak, and no later than 5 days after discovery. Most repairs can be done quickly, and 5 days should provide sufficient time to schedule maintenance and repair a leaking source. Attempting to repair the leak within 5 days will help to identify the leaks that cannot be repaired within the 15 day repair interval. Delay of repair beyond 15 days would be allowed for leaks which could not be repaired without a process unit shutdown.

Alternative Standards. In an effort to provide as much flexibility as possible, two alternative standards are being proposed for valves in gas and light liquid service. Owners or operators of affected facilities could identify and elect to comply with either of the alternative standards which allow tailoring of fugitive emissions control programs to their own operations. This would be accomplished by carrying out a monthly monitoring program for at least one year. Then, a plant owner or operator could elect to comply with one of the alternative standards which would be based on information gathered during the one year's implementation of monthly monitoring.

The first alternative standard would provide an allowable percentage of valves leaking. This type of standard would provide the flexibility of a performance standard by setting a limit which could be achieved by the most efficient and practical methods for a particular operation. As previously pointed out in the Selection of Format for the Proposed Standards section of this preamble, an industry-wide allowable leak percentage was not possible for valves because of the variability in valve leak frequency among plants within the industry. However, the alternative standard would allow each affected facility to comply with an allowable percentage of valves leaking which is determined by their individual performance based on monthly monitoring in the leak detection and repair program.

The allowable percentage of leakers would be determined by averaging the percentage of valves found leaking in each month of the last six months of monitoring, excluding those which could not be repaired without a process unit shutdown. To this average would be added the additional percentage of leaks which would occur if valves found leaking were monitored monthly and those found not leaking for two successive months were monitored quarterly. The resulting sum would be the performance standard for the percentage of valves leaking which would be allowed at any time. If an owner or operator elected to comply with an allowable percentage of valves leaking, he would be required to meet this standard at any point in time, even though his allowable percentage would be based on his average performance of a leak detection and repair program. Choosing this alternative standard would allow for the possibility of different monitoring and maintenance programs and substitution of engineering controls at the discretion of the owner or operator. It would also eliminate a large part of the recordkeeping and reporting associated with the proposed standard for valves.

This alternative would require a minimum of one performance test per year. Additional performance tests could be requested by EPA. If the results of a performance test showed a percentage of valves leaking higher than the allowable limit, the process unit would be in violation. Reporting would consist of submitting performance test results to the Administrator; quarterly reporting would be eliminated for valves.

The second alternative standard would provide for the use of different work practices which would achieve the same level of control as the standard for valves described in proposed § 60.482(f). After performing monthly monitoring for at least a year, the data collected would be used to devise work practices which would achieve the same control as the work practices specified in the proposed standards. Using this approach an owner or operator could optimize labor and capital costs to achieve the required level of control by varying monitoring intervals or installing valves with lower probabilities of leaking. Quarterly reporting would be required under this alternative as it is under the proposed standard in § 60.482(f).

An owner or operator would request approval from EPA to use either of the alternative standards for valves. A request for approval would be accompanied by a description of the standard being selected for compliance and data and calculations supporting the basis for the alternative standard. The Administrator would either approve or disapprove the request for the use of the alternative standard within ninety days after the request is submitted. A denial from the Administrator would be accompanied by his reasoning for denial. Until the alternative is approved, an owner or operator would be required to comply with the work practice standard propsoed for valves.

The approach of providing optional standards would be reassessed before promulgation of the proposed standards and if promulgated would be reviewed at the fourth year review. At that time, changing, eliminating, or continuing the alternative standards would be considered.

Control device. Control devices would be used to dispose of VOC captured in closed vent systems from barrier fluid degassing systems and enclosed pump and compressor seal areas. In all cases, these control devices would receive streams with low and intermittent flow rates. These control devices would in some cases be designed to dispose of organic streams from other sources in the plant, so that the VOC streams may contribute a very small percentage of the total loading on the control device. Because it would be technologically and economically impracticable to measure very low-flow streams and differentiate these streams from others, an emission standard was not proposed for these control devices.

Design requirements for control devices were considered to insure that appropriate emission reductions would be achieved from control devices used in conjunction with closed vent systems. Enclosed combustion sources and vapor recovery systems were considered as control devices for the closed vent system. Enclosed combustion was specified because open flares may only be 60 percent efficient for VOC destruction of these low flow intermittent streams. The design requirements specified in the proposed standard for enclosed combustion are the attainment of a minimum temperature of 816°C for 0.75 seconds. Under these conditions, at least 95 percent VOC destruction is achieved.

Vapor recovery systems were also evaluated as control devices for VOC from closed vent systems used with pumps and compressors. A control efficiency of at least 95 percent was chosen as the design requirement because it is the highest reasonable control efficiency practically achievable for vapor recovery systems such as carbon adsorption or condensation units used for fugitive emission sources. The design requirement selected for control devices was at least 95 percent VOC emission reduction. This control efficiency can be achieved by boiler furnaces, incinerators, process heaters, and carbon adsorption units.

Leakless equipment. As discussed in the previous sections, leakless equipment was considered for several of the fugitive emission sources to which these proposed standards apply. Sealed-bellows and diaphragm valves, canned and diaphragm pumps, and sealless compressors were considered for equipment standards. Although use of this equipment achieves excellent control (100 percent) of fugitive VOC emissions, its specification in the proposed standards was rejected because it is not widely applicable to SOCMI processes. However, use of leakless equipment is clearly equivalent if not better than the proposed standards for pumps, compressors, and valves and the proposed standards would allow the use of such equipment as an alternative to the required practices.

Leakless equipment would be required to operate with "no detectable emissions" at all times when it is in service. "No detectable emissions" of VOC means 200 ppm or less above background. The 200 ppm limit resulted from the measurement method of proposed Reference Method 21 as discussed in the Selection of Test Methods section of this preamble. Because leaks are not expected to occur in leakless equipment, the proposed standards require that its leakless status need only be verified annually using Method 21.

Exclusions. Flanges in all services, relief valves in light liquid service, and all components in "heavy liquid" (VOC fluids with vapor pressures less than 0.3 kPa at 20°C) VOC service were excluded from the routine monitoring and inspection requirements. However, if leaks are detected from these sources, the same allowable repair interval which applies to pumps, valves, and compressors would apply. These sources would be excluded from routine monitoring on the basis of data from EPA testing in petroleum refineries. Flanges in refineries have very low emission rates, and although they represent 61 percent of the total sources in refineries, their total contribution to overall emissions is about 2.2 percent. In EPA testing of fugitive emission sources in refineries, safety/relief valves in liquid VOC service also exhibited very low emission rates. These valves contribute only 0.2 percent of all emissions from refineries. Components in "heavy liquid" VOC service have emission rates that are much lower than "light liquid" or gas service components. Since all three of these types of sources contribute a very small portion of overall emission, including them in the monitoring and equipment requirements was not considered reasonable.

Also excluded would be equipment operating under a vacuum because leaks to atmosphere would not occur while the equipment operated at subatmospheric internal pressures.

Selection of Recordkeeping and Reporting Requirements

Recordkeeping and reporting would be required by the proposed standards to provide documentation for the assessment of compliance with (1) work practice standards, (2) equipment standards, (3) designs standards, (4) emission standards, and (5) operational standards. Review of records and reports would provide information for enforcement personnel to assess implementation of the proposed standards.

Compliance with the proposed standards would be determined by inspection and review of records. The General Provisions of 40 CFR Part 60 state that compliance with standards of performance, other than opacity standards, shall be determined only by performance tests. However, the proposed standards are, in general, not standards of performance and performance tests are not applicable. Therefore, an amendment to 40 CFR 60.11 is being proposed which would add a provision that allows compliance to be determined by review of records and inspection. The proposed standards then specify that compliance with the standards other than those for safety/relief devices will be determined by review of records and inspection.

Recordkeeping. Three recordkeeping alternatives were considered in evaluating the amount of recorded information needed to assess compliance with the proposed standards. These alternatives represent varying levels of the amount of information which could be recorded during activities associated with complying with the standards. Consequently, these alternatives represent varying levels of resource requirements for industry.

The first alternative would be to require no formal recordkeeping other than the recordkeeping required by the General Provisions of 40 CFR 60.7 for notification of construction or modification; reconstruction; and start-up, and shutdown or malfunction. Failure to require recorded documentation of the proposed work practice, equipment, design, and operational standards would not provide a mechanism for checking the thoroughness of the implementation of the proposed standards and, therefore, would not ensure fugitive emission reduction. Because the effectiveness of the proposed standards is dependent upon the thoroughness of industry's efforts, this alternative was not chosen as the basis of the recordkeeping requirements.

The second alternative would require recordkeeping to document results of the leak detection and repair program and information relating to equipment, design, and operation requirements. Information would be recorded in sufficient detail to enable owners/operators to demonstrate compliance with the standards and therefore provide reasonable assurance of adequate reduction of fugitive emissions. This alternative would require the maintenance of quantitiative records of repaired and unrepaired leaking fugitive emission sources. This alternative would require only the minimum amount of records on the equipment, design, emission, and operational standards and the work practice leak detection and repair program necessary to ensure the effective implementation of the proposed standards.

The third alternative would require recordkeeping of all the information generated by the proposed standards e.g., the number of fugitive emission sources detected at a concentration less than 10,000 ppmv. Much of this information would not be necessary to insure the implementation of the proposed standards. The level of recordkeeping in the third alternative is more appropriate for requirements to establish equivalent methods for emission limitation.

The second alternative was selected as the basis for the recordkeeping requirements of the proposed standards. This alternative would require the minimum industry resources to provide the necessary records to ensure effective implementation of the proposed standards. This alternative would also provide a basis for efficient reporting.

The proposed standards would require recording of specific information pertaining to the monthly monitoring for the work practice standards. Also information pertaining to repair of leaking pumps and compressors would be recorded. Each leaking fugitive emission source would be identified with readily visible weatherproof identification bearing the I.D. number of the fugitive emission source. The identification could be a tag or any other marking which allows ready location of the equipment. It could be removed after the fugitive emission source was repaired and verified non-leaking in two successive months. A log would be maintained for information pertaining to the leaking sources. The log would contain the instrument and operator identification numbers for valve monitoring, the leaking source identification number, the date of detection of the leak, the date of each attempt to repair the leak, and the maximum screening value after each attempt. The log would be kept for 2 years following the survey.

The proposed standards would require that "repair delayed" be recorded in the log for that particular fugitive emission source if repair were delayed beyond 15 calendar days after the date of detection. The reasons for unsuccessful repair, date of detection, repair methods attempted and the expected date of repair of the leak and the maximum screening value observed after repair would be recorded in the log. These records would be needed to establish a data base to provide the information necessary to allow enforcement personnel to assess compliance with the work practice standards.

The proposed standards would require no records for valves which were found not to leak. Similarly, no records would need to be maintained of the weekly pump inspections if no leaks were observed visually.

For the design standards, the proposed standards would require records to be maintained of the location of materials documenting control device design criteria, such as design specifications for a vapor recovery system or an incinerator. When the control equipment was modified or replaced, the date of replacement and new design criteria would be recorded.

A record of the source identification numbers for those fugitive emission sources operating under "no detectable emissions" limits would be required. Fugitive emission sources included in this category would be all safety relief valves and leakless equipment which has been designated for operation under "no detectable emissions" such as diaphragm valves or sealless pumps. Records of each measurement made to verify "no detectable emissions" would be required. The dates of the verification tests, ambient background VOC concentration measured, and the maximum VOC concentration measured at the source would be recorded.

The proposed standards contain very specific requirements concerning recordkeeping. These requirements are in addition to the requirements set forth in the General Provisions (40 CFR 60.7). Some of the requirements in § 60.7 are duplicated in the proposed standards. Also § 60.7 requires some records that may be unnecessary to determining compliance with the proposed standards. To eliminate redundancy and unnecessary recordkeeping, the proposed standards state that §§ 60.7 (b) and (d) would not be applicable to owners or operators affected by the proposed standards. A revision to the General Provisions is also being proposed to provide a mechanism to exclude the coverage of §§ 60.7 (b) and (d).

Reporting. Three reporting alternatives were considered in evaluating the amount of reported information needed to assess compliance with the proposed standards. These alternatives represent varying levels of enforcement monitoring of the proposed standards. They also represent varying levels of resources required for industry and enforcement personnel. Enforcement personnel would review the reports submitted by industry personnel on the status of implementing the proposed standards. This review procedure reduces the need for in-plant inspections.

The first alternative would require minimum reporting of information which was recorded to monitor compliance with the proposed standards. Recorded information would be available at the plant to enforcement personnel, but the owner/operator would be required only to supply a report testifying that all equipment, design, emission, and operational standards had been met, that all components had been monitored and that those with leaks had been repaired. The more detailed recorded information would then be available upon specific request or plant visit by enforcement personnel. This alternative would not provide a mechanism for checking the thoroughness of the industry's efforts to reduce VOC fugitive emissions without a visit to the plant site. Thus, assessment of compliance with the standards would be intermittent and somewhat random since it would mainly be determined through in-plant inspections rather than through submittal of information to enforcement agencies.

The second reporting alternative would require the submittal of information in sufficient detail to insure compliance with the proposed work practice, equipment, design, emission, and operational standards. Included in the reports would be summarized data concerning leaks detected during the reporting period. This requirement would provide enforcement personnel with an overview of the repair of leaks. A report signed by the plant owner/operator attesting to the validity of the results of the monitoring surveys and instrument calibration procedures would allow enforcement personnel to assess the compliance of facilities with the work practice standards. This report would also attest to the proper application, operation, and maintenance of the equipment required by the proposed equipment, design, emission, and operational standards. These requirements would not necessarily include all records kept by industry. Only information that would be necessary to assess the implementation of the equipment standards would be required.

The third reporting alternative would require the submittal of all the information obtained while conducting leak detection and repair programs. This information would include the information reported in the second alternative and, additionally, comprehensive information on all tested components. This reporting alternative would necessitate the reporting of all information included in the recordkeeping requirements. The extensiveness of the reported information would require the SOCMI to report data that would be more appropriate for demonstrating equivalency of alternate methods of emission control than for establishing compliance with proposed standards.

The second alternative was selected as the reporting requirement for the proposed standards. This alternative provides sufficient information to review compliance without requiring excessive resources from industry. The first alternative was not selected because the compliance with work practice standards and the implementation of equipment design, emission, and operational standards could not be adequately assessed by enforcement personnel to insure that reductions in fugitive emissions were achieved. The third reporting alternative

was not selected because the additional resources expended by industry would not facilitate assessment of compliance and implementation of work practice, equipment, design, emission and operational standards.

Under the proposed standards quarterly reports would be submitted. The reports would contain summary data of the number of leaks found and repaired within the reporting period. The number of leaks not repaired within 15 days, reasons for their non-repair, and anticipated dates of repair would also be required. The owner or operator would be required to sign the report stating whether or not the process unit was operated in full compliance with all work practice, design and operational, and equipment provisions of the standard. If the owner or operator had more than one affected facility, he could submit one statement of compliance for all of them. Example report formats are shown in Figures 1, 2, 3, and 4 in the proposed standards. These are examples only. The required information could be submitted in any other useful form.

As stated previously in the Safety/Relief Valves section of this preamble, performance tests generally require three runs and notification of the Administrator 30 days before the test. However, this prenotification is not reasonable for the proposed standards because tests to determine no detectable emissions must occur within five days after an overpressure relief. Because of this conflict in reporting requirements, affected facilities have been exempted from 40 CFR 60.8(d).

Impacts of reporting requirements. In addition to requirements of the General Provisions of Subpart A of 40 CFR Part 60, the proposed standards would require quarterly reports including information pertaining to the required work practices. Estimates of the efforts associated with the reporting requirements indicate that the industry would incur manpower expenditures of approximately 53 manyears in 1985 to fulfill the requirement which would apply to about 830 affected facilities. No overlapping data requirements with other government agencies are anticipated.

Equivalence of Alternative Means of Emission Limitation

Under the provisions of Section 111(h) of the Clean Air Act, if the Administrator establishes work practices, equipment, design or operational standards, then the Administrator must allow the use of alternative means of emission limitations if they achieve a reduction in air pollutants equivalent to that achieved under requirements of a standard of performance. Sufficient data would be required to show equivalency and a public hearing would be required.

Individual owners/operators in SOCMI could request alternatives beyond those now provided for specific requirements such as the proposed equipment and the proposed leak detection and repair program. Sufficient information would have to be collected by a facility to demonstrate that the alternative control techniques would be equivalent to the control techniques required by the proposed standards. This information would then be submitted to EPA in a request for a determination of equivalence. A public hearing notice would be published in the **Federal Register.**

The data submitted in a request for equivalency of alternative control measures would take the form of test data to substantiate equivalency. To obtain permission to use alternate types of equipment, VOC emissions test data would be supplied for comparison to emissions data from the specified equipment. Application for equivalence of work practices would require submission of twelve months' data for the leak detection and repair program specified in the standards and data for the alternate system.

After public notice and opportunity for public hearing, the Administrator would determine the equivalence of an alternative means of emission limitation and would publish his determination in the **Federal Register.**

Selection of Test Methods

Several fugitive emission measurement and monitoring methods were identified and analyzed in the development of the proposed standards. Evaluation of these alternative methods was based upon results of emission testing conducted at petroleum refineries and synthetic organic chemical manufacturing plants.

One method of emission measurement is the direct measurement of mass per unit time, e.g. kg/hr, from each source. For the wide variety of sources subject to this standard, direct measurement would require "bagging" techniques for the measurement of mass emissions. "Bagging" means to enclose a fugitive emission source with a shroud in order to capture all of the emissions from the source. The shroud must be attached securely to the source in order to insure complete capture of emissions, and a flow measurement device is needed to measure the volumetric emission rate. After an appropriate equilibration time, which depends on the shroud and the leak rate (5–30 minutes), a sample of the effluent from the shroud is taken to determine the VOC concentration. The VOC mass emission rate is then calculated based on the low volumetric flow rate and VOC concentration. Because of the large numbers of sources in an affected facility as well as the different physical configurations and diverse locations, direct measurements of leak rates would be costly, time-consuming, and impractical for routine testing. Therefore, direct measurement of leak rates was not selected as the emission measurement method for the proposed standard.

Indirect emission measurement methods or monitoring methods that would yield qualitative indications of leaks were reviewed. These monitoring methods are: (1) a periodic individual component survey that would monitor all fugitive emission sources using portable VOC detectors; (2) a periodic area, or walkthrough survey that would monitor ambient concentrations of VOC using portable VOC detectors; and (3) a continuous fixed-point monitoring system that would consist of stationary sensing devices with a remotely located central readout or a central analyzer system (gas chromatograph) with remote sample collection.

Individual component surveys using portable VOC detectors would be the most efficient method for detecting all leaks. The periodic individual component survey could be done in a reasonable amount of time by monitoring personnel and could be accomplished with relative ease. The cost of leak detection equipment for an individual component survey would be reasonable.

Two individual component survey methods were identified: (1) leak detection by spraying each component with a soap solution and observing bubble formation; and (2) leak detection by measuring VOC concentration with a portable VOC detector. The magnitude of leak rates based on bubble formation is difficult to assess. In addition, soap bubble formation does not distinguish VOC emissions from other leaking gases or vapors, and bubble formation is subject to component temperature and component configuration restraints. Therefore, measurement of VOC concentration with a portable VOC detector was selected as the method for monitoring individual components.

A periodic area, or walkthrough survey of ambient VOC concentrations with a portable VOC detector and recorder would be a less effective method for detecting specific leaks than an individual component survey. Interference due to local meteorological

conditions and leaks from adjacent units would probably prevent the detection of all leaks within a process unit. In fact, previous studies have indicated that the area survey is suitable only for locating large leaks. In order to have a walkthrough method that is as sensitive to leaks as an individual component survey, the "action level" indicating the need to do a complete survey of equipment within a specific area would necessarily need to be very low. It would also probably need to be unit and meteorology specific (different action levels for different wind speeds). With an action level this low the background level of VOC could cause considerable interference and leaks would undoubtedly be indicated almost everywhere in the unit. An individual component survey would in many cases be necessary to locate the actual leak. Therefore, since it is not possible to provide an industry-wide action level indicative of leaks for a given process unit, and, since any action level that was determined could give so many false indications of leaks that an essentially complete individual component survey would be necessary to detect the actual leaks, walkthrough testing was not judged to be a reasonable approach for leak detection.

Implementation of a continuous fixed-point monitoring system would require a portable VOC detector to locate specific leaking components in addition to multiple stationary monitors or sample collectors. This system may be less efficient than the other methods for detecting VOC emissions. Possible meteorological interference and problems with measuring VOC concentrations of remotely collected samples would limit the efficiency of leak detection by a fixed-point system. Except for possible monitoring equipment calibration problems, the fixed-point system would be operated with relative ease by monitoring personnel, who would still be required to use portable VOC detection equipment to find the individual leaking components indicated by the fixed-point monitoring system. Implementation of a continuous fixed-point monitoring system would be capital-intensive, although leak detection labor costs would probably be the least of the three monitoring methods.

Some characteristics of the three indirect emission measurement methods are similar, including safety considerations and ease of operation for monitoring personnel. Some aspects of the three methods are different. Capital and operating costs vary, as do the efficiencies of the methods in detecting VOC leaks. The individual component method is characterized by a superior leak detection efficiency and reasonable costs. Considering these factors, the individual component method was selected as the monitoring method for the proposed standards.

Selected Test Procedure. The proposed test method, Method 21, would incorporate the use of a portable VOC detector to measure the concentration of VOC at a source to yield a qualitative or semiquantitative indication of the VOC emission rate from the source. The general approach of this technique assumes that if a VOC leak exists, there is an increased VOC concentration in the vicinity of the leak. Tests in petroleum refineries have established general concentration versus mass emission relationships for various fugitive emission sources. Also, tests have indicated that local conditions cause variations in concentration readings at points removed from the surface of the interface on the component where leaking occurs. Therefore, the proposed method requires the concentration to be measured at the leak interface.

As discussed in the Selection of Emission Limit, Equipment, Work Practice, Design, and Operational Standards section in this preamble, a definition of a leak for valves was selected to be 10,000 ppm. This concentration level is measured at the leak interface and qualitatively relates to emission rates. Also discussed in that section is the definition of no detectable emissions. A concentration for no detectable emissions needs to be defined such that when emissions occur they can be detected and when emissions are not occuring they are not mistakenly detected. Based on considerations of the calibration procedures and monitor variability at low meter deflections, two percent of the definition of a leak was selected as the definition of no detectable emissions. Thus, in this case, no detectable emissions means a VOC concentration of less than 200 ppm above background concentration at the leak interface.

The portable VOC detector used in the proposed monitoring program would be required to conform to several specifications to insure consistent industry-wide monitoring, effective VOC emission reduction efforts, and safe leak detection programs. Equipment specifications are proposed in Method 21 as follows: (1) The instrument should respond to total hydrocarbons or combustible gases. Detector types which may meet this requirement include catalytic oxidation, flame ionization, infrared absorption, and photoionization; (2) the instrument should be safe for operation in explosive atmospheres; (3) the instrument should incorporate an appropriate range or dilution option so that concentration levels of 10,000 ppmv can be measured; (4) the instrument should be equipped with a pump so that a continuous sample can be provided to the detector. The nominal sample flow rate should be 1–3 liters per minute; (5) the scale of the instrument readout meter should be readable to ±5 percent at 10,000 ppmv.

The proposed standards would require that the monitoring instrument be calibrated before each monitoring survey. The proposed standards would require that the monitoring instrument be calibrated with methane. The required calibration gases would be a zero gas (air, 3 ppmv VOC) and a methane-air mixture of approximately 10,000 ppmv methane. If cylinder calibration gas mixtures would be used, they would have to be analyzed and certified by the manufacturer to within ±2 percent accuracy as required in proposed Method 21. Calibration gases prepared by the user according to an accepted gaseous standards preparation procedure would also have to be accurate within ±2 percent, as required in proposed Method 21.

Proposed Method 21 requires that the monitoring instrument would be subjected to other performance requirements prior to being placed in service for the first time. The instrument would be subjected to these performance criteria every six months and after any modification or replacement of the instrument detector.

Public Hearing

A public hearing will be held to discuss these proposed standards in accordance with Section 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations should contact EPA at the address given in the ADDRESSES section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement with EPA before, during, or within 30 days after the hearing. Written statements should be addressed to the Central Docket Section address given in the ADDRESSES section of this preamble.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at EPA's Central Docket Section in Washington, D.C. (see ADDRESSES section of this preamble).

Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered by EPA in the development of this proposed rulemaking. The principal purposes of the docket are (1) to allow interested parties to readily identify and locate documents so that they can intelligently and effectively participate in the rulemaking process and (2) to serve as the record in case of judicial review.

Miscellaneous

As prescribed by Section 111, establishment of standards of performance for the synthetic organic chemical manufacturing industry was preceded by the Administrator's determination (40 CFR 60.16, 44 FR 49222, dated August 21, 1979) that sources within this industry contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. In accordance with Section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. The Administrator will welcome comments on all aspects of the proposed standards, including economic and technological issues, and on the proposed Appendix E and Method 21.

It should be noted that standards of performance for new sources established under Section 111 of the Clean Air Act reflect:

> * * * application of the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated [Section 111(a)(1)].

Although there may be emission control technology available that can reduce emissions below those levels required to comply with standards of performance, this technology might not be selected as the basis of standards of performance because of costs associated with its use Accordingly, standards of performance should not be viewed as the ultimate in achievable emission control. In fact, the Act requires (or has the potential for requiring) the imposition of a more stringent emission standard in several situations.

For example, applicable costs do not necessarily play as prominent a role in determining the "lowest achievable emission rate" for new or modified sources locating in nonattainment areas, i.e., those areas where statutorialy mandated health and welfare standards are being violated. In this respect, Section 173 of the Act requires that new or modified sources constructed, in an area where ambient pollutant concentrations are above the National Ambient Air Quality Standard (NAAQS), must reduce emissions to the level that reflects the "lowest achievable emission rate" (LAER), as defined in Section 171(3) for such category of source. The statute defines LAER as that rate of emissions based on the following, whichever is more stringent:

> (A) The most stringent emission limitation which is contained in the implementation plant of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or
>
> (B) The most stringent emission limitation which is achieved in practice by such class or category of source.

In no event can the emission rate exceed any applicable new source performance standard (Section 171(3)].

A similar situation may arise under the prevention of significant deterioration of air quality provisions of the Act (Part C). These provisions require that certain sources [referred to in Section 169(1)] employ "best available control technology" (BACT) as defined in Section 169(3) for all pollutants regulated under the Act. Best available control technology must be determined on a case-by-case basis, taking energy, environmental and economic impacts, and other costs into account. In no event may the application of BACT result in emissions of any pollutants which will exceed the emissions allowed by an applicable standard established pursuant to Section 111 (or 112) of the Act.

In all cases, State Implementation Plans (SIP's) approved or promulgated under Section 110 of the Act must provid for the attainment and maintenance of NAAQS designed to protect public health and welfare. For this purpose, SIP's must in some cases require greater emission reduction than those required by standards of performance for new sources.

Finally, States are free under Section 116 of the Act to establish even more stringent emission limits than those established under Section 111 of those necessary to attain or maintain the NAAQS under Section 110. Accordingly, new sources may in some cases be subject to limitations more stringent than standards of performance under Section 111, and prospective owners and operators of new sources should be aware of this possibility in planning for such facilities.

This regulation will be reviewed four years from the date of promulgation as required by the Clean Air Act. This review will include an assessment of such factors as the need for integration with other programs, the existence of alternative methods, enforceability, and improvements in emission control technology, and reporting requirements. The reporting requirements in this regulation will be reviewed as required under EPA's sunset policy for reporting requirements in regulations.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any new source standard of performance promulgated under Section 111(b) of the Act. An economic impact assessment was prepared for the proposed regulations and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the proposed standards to insure that the proposed standards would represent the best system of emission reduction considering costs. The economic impact assessment is included in the Background Information Document.

Dated: December 18, 1980.

Douglas M. Costle,

Administrator.

It is proposed to amend 40 CFR Part 60 as follows:

1. By adding paragraph (f) to § 60.7 to Subpart A—General Provisions as follows:

§ 60.7 Notification and recordkeeping.

* * * * *

(f) Individual subparts of this part may include specific provisions which clarify or make inapplicable the provisions set forth in this section.

(Sec. 111, 114, 301(a) of the Clean Air Act, as amended (42 U.S.C. 7411, 7414, 7601(a)))

2. By adding paragraph (f) to § 60.11 to Subpart A—General Provisions as follows:

§ 60.11 Compliance with standards and maintenance requirements.

* * * * *

(f) Special provisions set forth under an applicable subpart of this part shall supersede any conflicting provisions of this section.

(Sec. 111, 301(a) of the Clean Air Act, as amended (42 U.S.C. 7411, 7601(a)))

3. By adding Subpart VV as follows:

Subpart VV—Standards of Performance for Fugitive Emission Sources in the Synthetic Organic Chemicals Manufacturing Industry

Sec.

60.480 Applicability and designation of affected facility.

Sec.
60.481 Definitions.
60.482 Standards.
60.483 Alternative Standards.
60.484 Equivalence of alternative means of emission limitation.
60.485 Test methods and procedures.
60.486 Recordkeeping requirements.
60.487 Reporting requirements.

Authority: Sec. 111, 301(a) of the Clean Air Act as amended [42 U.S.C. 7411, 7601(a)], and additional authority as noted below.

Subpart VV—Standards of Performance for Fugitive Emission Sources in the Synthetic Organic Chemicals Manufacturing Industry

§ 60.480 Aplicability and designation of affected facility.

(a) The provisions of this subpart apply to affected facilities within the synthetic organic chemicals manufacturing industry. An affected facility is the group of all fugitive emission sources within a process unit.

(b) Any facility under paragraph (a) of this section that commences construction or modification after January 5, 1981 would be subject to the requirements of this subpart.

(c) Addition or replacement of fugitive emission sources for the purpose of process improvement which is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

§ 60.481 Definitions.

As used in this subpart, all terms not defined here shall have the meaning given them in the Act and in Subpart A of Part 60, and the following terms shall have the specific meanings given them.

"Closed Vent System" means a system which is not open to the atmosphere and which is composed of piping, connections, and, if necessary, flow inducing devices that transport gas or vapor from a fugitive emission source to an enclosed combustion device or vapor recovery system.

"Enclosed Combustion Device" means any combustion device which is not open to the atmosphere such as a process heater or furnace, but not a flare.

"First Attempt at Repair" means to take rapid action for the purpose of stopping or reducing leakage of organic material to atmosphere using best modern practices.

"Fugitive Emission Source" means each pump, valve, safety/relief valve, open-ended valve, flange or other connector, compressor, or sampling system.

"In Gas/Vapor Service" means that the fugitive emission source contains process fluid that is in the gaseous state at operating conditions.

"In Light Liquid Service" means that the fugitive emission source contains a liquid that meets the conditions specified in § 60.485(c).

"Open-Ended Valve" means any valve, except safety/relief valves, with one side of the valve seat in contact with process fluid and one side that is open to the atmosphere, either directly or through open piping.

"Process Improvement" means routine changes made for safety and occupational health requirements, for energy savings, for better utility, for ease of maintenance and operation, for correction of design deficiencies, for bottleneck removal, for changing product requirements, or for environmental control.

"Process Unit" means equipment assembled to produce, as intermediates or final products, one or more of the chemicals listed in Appendix E of this part. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the final product.

"Quarter" means a three month period. The first quarter concludes at the end of the last full month during the 180 days following initial startup.

"Repaired" means that a fugitive emissions source is adjusted or otherwise altered in order to reduce fugitive emissions below the level that indicates the necessity for repair as required in § 60.482.

"Synthetic Organic Chemicals Manufacturing Industry" means the industry that produces, as intermediates or final products, one or more of the chemicals listed in Appendix E of this part.

"In Vacuum Service" means that a fugitive emission source is operating at an internal pressure which is continuously less than 100 kPa.

"Vapor Recovery System" means any type of control device capable of removing VOC vapor from a gas stream, such as carbon adsorption, vapor compression, and vapor refrigeration systems.

"Volatile Organic Compound (VOC)" means any organic compound, which participates in atmospheric photochemical reactions or is measured by the applicable test methods described in Reference Method 21.

"In VOC Service" means that a fugitive emission source contains or contacts a process fluid that is at least 10 percent VOC by weight as determined according to the provisions of § 60.485(d).

§ 60.482 Standards.

Each owner or operator subject to the provisions of this subpart shall comply with the following requirements for fugitive emission sources in VOC service, except those in vacuum service.

(a) Pumps in light liquid service.

(1) Each pump shall be equipped with a dual mechanical seal system that includes a barrier fluid system except as provided in § 60.482(a)(7), § 60.482(a)(8), or § 60.482(j).

(2) Each fluid system as required in § 60.482(a)(1) shall be equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both. The barrier fluid shall not be a light liquid or gaseous VOC.

(3) Each dual mechanical seal system as required in § 60.482(a)(1) shall be—

(i) Operated with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure;

(ii) Equipped with a barrier fluid degassing reservoir that is connected by a closed vent system to an enclosed combustion device designed for a minimum VOC residence time of 0.75 seconds at 816°C or to a vapor recovery system designed for a minimum of 95 percent capture of VOC input to the vapor recovery system; or

(iii) Equipped with a system to purge the barrier fluid into a process stream, with no VOC emission to atmosphere.

(4) Each pump shall be checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seal. If indications of liquids dripping from the pump seal are seen, then a leak is detected.

(5) Each sensor as required in § 60.482(a)(2) shall be checked daily or shall be equipped with an audible alarm. Based on design considerations and operating experience, a criterion that indicates failure of the seal system or the barrier fluid system, or both shall be determined for each dual mechanical seal system. If this criterion is registered by the sensor, a leak is detected.

(6) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected except as provided in § 60.482(h). A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(7) Any pump that is not equipped as required in § 60.482(a)(1) shall be equipped with a closed vent system capable of transporting any leakage from the seal to an enclosed combustion device designed for a minimum VOC residence time of 0.75 seconds at 816°C or to a vapor recovery system designed for a minimum of 95 percent capture of the VOC input to the system. Closed vent systems, enclosed combustion

devices and vapor recovery systems used to comply with this requirement shall be operated at all times when VOC emissions could occur.

(8) Any pump that is designated as required in § 60.486(d)(1) for emissions having a concentration of less than 200 ppm above background, as determined by the methods specified in § 60.485(b), is exempt from the requirements of §§ 60.482(a)(1)–(7) if the pump—

(i) Has no externally actuated shaft penetrating the pump housing,

(ii) Is operated with emissions less than 200 ppmv above background as measured by the methods specified in § 60.485(b), and

(iii) Is tested for compliance with § 60.482(a)(8)(ii) annually and at the request of the Administrator.

(9) Closed vent systems, enclosed combustion devices, and vapor recovery systems used to comply with §§ 60.48a(3) (ii) and (iii) shall be operated at all times when VOC emissions may occur.

(b) Compressors.

(1) Each compressor shall be equipped with a seal system that includes a barrier fluid system and that prevents leakage of process fluid to the atmosphere, except as provided in § 60.482(b)(6), § 60.482(b)(7), or § 60.482(j)

(2) Each barrier fluid system as required in § 60.482(b)(1) shall be equipped with a sensor that will detect failure of the seal system. The barrier fluid shall not be a light liquid or gaseous VOC.

(3) Each seal system as required in § 60.482(b)(1) shall be—

(i) Operated with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure;

(ii) Equipped with a barrier fluid system that is connected by a closed vent system to an enclosed combustion device designed for a minimum VOC residence time of 0.75 seconds at 816°C or to a vapor recovery system designed for a minimum of 95 percent capture of VOC input to the system; or

(iii) Equipped with a system to purge, with no VOC emission to atmosphere, the barrier fluid into a process stream.

(4) Each sensor as required in § 60.482(b)(2) shall be checked daily or shall be equipped with an audible alarm. Based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system or both shall be determined for each dual mechanical seal system. If this criterion is attained and is registered by the sensor, a leak is detected.

(5) When a leak in detected it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected except as provided in § 60.482(h). A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(6) Any compressor that is not equipped as required in § 60.482(b)(1) shall be equipped with a closed vent system capable of transporting any leakage from the seal to an enclosed combustion device designed for a minimum VOC residence time of 0.75 seconds at 816°C or to a vapor recovery system designed for a minimum of 95 percent capture of VOC input to the vapor recovery system. Closed vent systems, enclosed combustion devices and vapor recovery systems used to comply with this requirement shall be operated at all times.

(7) Each compressor that is designated as required in § 60.486(d)(1) for concentrations of emissions less than 200 ppm above background, as determined by the methods specified in § 60.485(b), is exempt from the requirements of §§ 60.482(b)(1)–(6) if it is operated with emissions having concentrations of less than 200 ppmv above background, as measured by the methods specified in § 60.485(b) and if it is tested for compliance annually.

(8) Closed vent systems, enclosed combustion devices, and vapor recovery systems used to comply with §§ 60.482(b)(3) (ii) and (iii) shall be operated at all times when VOC emissions may occur.

(c) Safety/relief valves in gas/vapor service.

(1) Each safety/relief valve in gas/vapor service shall be operated at a state of emissions having a concentration of less than 200 ppm above background, as determined by the methods specified in § 60.485(b), except during pressure releases.

(2) Each safety/relief valve shall be returned to a state of emissions having a concentration of less than 200 ppm above background after each emergency pressure release as soon as practicable, but no later than 5 calendar days, after each episode of pressure release.

(d) Sampling systems.

(1) Each sampling system shall be equipped with a closed purge system.

(2) Each closed purge system as required by § 60.482(d)(1) shall return the purged process fluid directly to the process line, or shall collect the purged process fluid for recycle or disposal without VOC emissions to the atmosphere.

(3) *In-situ* sampling systems are exempt for §§ 60.482(d)(1) and (2).

(e) Open-ended valves.

(1) Each open-ended valve shall be equipped with a cap, blind flange, plug, or a second closed valve which is attached to seal the open end at all times except during operations requiring process fluid flow through the open-ended line.

(2) Each open-ended valve equipped with a second valve attached to the open end of the process valve, as required in § 60.482(e)(1), shall be operated such that the process side valve is closed first, after operations requiring flow through the open-ended valve.

(f) Valves in gas/vapor service and valves in light liquid service.

(1) Each valve shall be monitored monthly to detect leaks by the methods specified in § 60.485(a).

(2) If a VOC concentration of 10,000 ppm or greater is measured, a leak is detected.

(3) Any valve for which a leak is not detected for two successive months may be monitored the first month of every quarter beginning with the next quarter by the methods specified in § 60.485(a) until a leak is detected. If a leak is detected, the valve shall be monitored monthly until a leak is not detected for two successive months.

(4) When a leak is detected it shall be repaired as soon as practicable, but no later than 15 calendar days after it is detected except as provided in § 60.482(h). A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(5) First attempts at repair include, but are not limited to, the following best modern practices if practicable:

(i) Tightening of bonnet bolts.

(ii) Replacement of bonnet bolts.

(iii) Tightening of packing gland nuts.

(iv) Injection of lubricant into lubricated packing.

(6) Any valve that is designated as required in § 60.486(d)(1) for emissions having a concentration of less than 200 ppm above background as determined by the methods specified in § 60.485(b) is exempt from the requirements of §§ 60.482(f)(1) and (3) if the valve—

(i) Has no external actuating mechanism in contact with the process fluid;

(ii) Is operated with emissions having a concentration of less than 200 ppm above background as determined by the method specified in § 60.485(b); and

(iii) Is tested for compliance with § 60.482(f)(6)(ii) annually and at the request of the Administrator.

(g) Pumps and valves in heavy liquid service, safety/relief valves in light liquid and heavy liquid service, and flanges and other connectors shall be monitored within 5 days by the method specified in § 60.485(a) if evidence of a potential leak is found by visual,

audible, olfactory, or any other detection method, as follows:

(1) If a VOC concentration of 10,000 ppm or greater is measured, a leak is detected.

(2) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected. The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(h) Delay of repair of fugitive emission sources for which leaks have been detected will be allowed only if the repair is technically infeasible without a complete or partial process unit shutdown. Delay of repair will not be allowed beyond a process unit shutdown.

(i) Compliance with §§ 60.482 (a), (b), (c), (d), (e), (f), and (h) in this subpart shall be determined by review of records and inspection. Compliance with §§ 60.482 (a)(8), (b)(7), (c), and (f)(6) shall be determined by the methods specified in § 60.485(b). Compliance shall be achieved within 180 days of initial startup.

(j) A determination of equivalence of alternative means of emission limitation to the requirements of §§ 60.482 (a), (b), (d), (e), (f), or (g) may be requested as provided in § 60.484. If the Administrator determines that an alternative means of emission limitation is at least equivalent to the requirements of §§ 60.482 (a), (b), (d), (e), (f), or (g), the requirements of that determination shall apply.

§ 60.483 Alternative standards.

(a) Valves in gas/vapor and valves in light liquid service—allowable percentage of valves leaking.

(1) After performing a monthly leak detection and repair program in accordance with §§ 60.482(f) (1), (2), (4), and (5) for at least twelve months, an owner or operator may request approval from the Administrator to comply with an allowable percentage of valves leaking in gas/vapor and light liquid service.

(2) The following requirements shall be met if an owner or operator wishes to comply with an allowable percentage of valves leaking.

(i) An owner or operator must request approval of the Administrator to comply with an allowable percentage of valves leaking.

(ii) An owner or operator must have performed a monthly leak detection and repair program in accordance with §§ 60.482 (f), (1), (2), (4), and (5) for at least twelve months before a request for approval is submitted.

(iii) A request of approval of an allowable percentage of valves leaking must be accompanied by data and calculations which describe the methodology used for determining the allowable percentage of valves leaking.

(iv) A performance test as specified in § 60.483(a)(4) shall be conducted annually and at the request of the Administrator. A written report of the results of the performance test shall be submitted to the Administrator within a time interval specified by the Administrator.

(v) If a valve leak is detected, an attempt must be made to repair it.

(3) The allowable percentage of leaks shall be determined by adding the monthly baseline percentage of leaks demonstrated during the last six months under monthly monitoring and the monthly incremental percentage of leaks which would have occured if the provisions of § 60.482(f)(3) had been followed.

(i) The monthly baseline percentage of leaks shall be determined by obtaining a monthly average of the percentage of leaks found in an affected facility during the last six months of operation under monthly monitoring.

(ii) The monthly incremental percentage of leaks shall be determined by averaging the percentage of valves for which leaks had been detected in the second and third months of the last two quarters but which had not been detected during the first months of the last two quarters.

(iii) A percentage of leaks shall be determined by dividing the total number of leaks by the total number of valves in an affected facility, excluding those leaks for which repair has been delayed because a process unit shutdown would be required as provided in § 60.482(h) and excluding those valves which are complying with the provisions of § 60.482(f)(6).

(4) Performance tests shall be conducted in the following manner.

(i) All valves within the affected facility shall be monitored by the methods specified in § 60.485(a).

(ii) If a VOC concentration of 10,000 ppm or greater is measured, a leak is detected.

(iii) The leak percentage shall be determined by dividing the number of valves for which leaks are detected by the number of valves within the affected facility, excluding valves for which repair has been delayed because a process unit shutdown would be required, and excluding those which are complying with the provisions of § 60.482(f)(6).

(iv) For those valves for which repair has been delayed because a process unit shutdown would be required, records of attempted repair must be provided at the request of the Administrator. Records of attempted repair for those valves for which repair has been delayed shall be kept for two years.

(5)(i) The Administrator will either approve or disapprove the request for the use of the alternative standard within ninety days after the request is submitted.

(ii) If the Administrator denies the use of this alternative, the owner or operator will be notified of the reasons for the denial.

(iii) If the Administrator is reviewing a request for the use of this alternative as specified in §§ 60.483(a) (1) and (2), additional information may be requested of the owner or operator seeking approval of this option.

(iv) Until this alternative is approved, the owner or operator shall be subject to the requirements of § 60.482(f).

(6) The reporting provisions of §§ 60.487(b), (2), (3), (4), (5), (6) and (9) would not apply to owners or operators complying with an allowable percentage of valves leaking.

(b) Valves in gas/vapor and valves in light liquid service—alternative work practices.

(1) After performing a monthly leak detection and repair program in accordance with §§ 60.482(f), (1), (2), (4) and (5) for at least twelve months, an owner or operator may request approval of the administrator to comply with an alternative work practice for valves in gas/vapor and valves in light liquid service which differs from the work practice required in §§ 60.482(f) (1) and (3).

(2) The following requirements shall be met if an owner or operator wishes to comply with an optional work practice.

(i) An owner or operator must request approval of the Administrator to comply with an optional work practice standard.

(ii) An owner or operator must have performed a monthly leak detection and repair program in accordance with §§ 60.482(f) (1), (2), (4) and (5) for twelve months before a request for approval is submitted.

(iii) A request for approval of an optional work practice standard must be accomplished by data and calculations showing that the optional work practice complies with the requirements of § 60.487(b)(3).

(3) The optional work practice program shall be designed to accomplish the emission reduction associated with the required program in §§ 60.482(1)(f), (2), (3), (4) and (5). To demonstrate this reduction, an owner or operator shall determine the leak occurrence and recurrence for each program. These data shall be used to show that the expected

percentage of valves leaking in the affected facility under the optional program is equal to or less than the expected percentage of valves leaking under the required program.

(4) (i) The Administrator may deny the use of this option for any owner or operator within 90 days of the request for approval. If disapproval is not given within 90 days of the request for approval, the request is approved.

(ii) If the Administrator denies the use of this option, the owner or operator will be notified of the reasons for the denial.

(iii) If the Administrator is reviewing a request for the use of this alternative as specified in §§ 60.483(a) (1) and (2), additional information may be requested of the owner or operator seeking approval of this alternative.

(iv) Until this alternative is approved, the owner or operator shall be subject to the requirements of § 60.482(f).

§ 60.484 Equivalence of alternative means of emission limitation.

(a) Each owner or operator subject to the provisions of this subpart may apply to the Administrator for determination of equivalence for any alternative means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to the reduction in emissions of VOC achieved by the controls required in §§ 60.482 (a), (b), (d), (e), (f), and (g).

(b) Determination of equivalence to the equipment requirements of §§ 60.482 (a), (b), (d), and (e) will be evaluated by the following guidelines:

(1) Each owner or operator applying for an equivalence determination shall be responsible for collecting and verifying test data to demonstrate equivalence of any alternative means of emission limitation to the requirements of §§ 60.482 (a), (b), (d), or (e).

(2) The Administrator will compare test data for the alternative means of emission limitation to test data for the equipment requirements of §§ 60.482 (a), (b), (d), or (e).

(3) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the requirements of §§ 60.482 (a), (b), (d), or (e).

(c) Determination of equivalence to the work practices required in § 60.482(f) will be evaluated by the following guidelines:

(1) Each owner or operator applying for a determination of equivalence shall be responsible for collecting and verifying test data to demonstrate equivalence of an alternative means of emission limitation to the requirements of § 60.482(f).

(2) For each affected facility for which a determination of equivalence is requested, the emission reduction achieved by the requirements of § 60.482(f) shall be demonstrated for a minimum period of 12 months. A quantitative performance level shall be determined that describes the emission reduction achieved by the requirements of § 60.482(f).

(3) For each affected facility, the emission reduction achieved by any alternative means of emission limitation shall be demonstrated.

(4) Each owner or operator applying for a determination of equivalence shall commit to compliance with a performance that provides for emission reductions equal to or greater than the emission reductions achievable by the requirements of § 60.482(f).

(5) The Administrator will compare the demonstrated emission reduction for the alternative means of emission limitation to the demonstrated emission reduction for the work practices required in § 60.482(f) and will consider the commitment in § 60.484(c)(4).

(6) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the requirements of § 60.482(f).

(d) After a request for determination of equivalence is received, the Administrator will publish a notice in the **Federal Register** and provide the opportunity for public hearing. After notice and opportunity for public hearing, the Administrator will determine the equivalence of an alternative means of emission limitation and will publish the determination in the **Federal Register**.

§ 60.485 Test methods and procedures.

Each owner or operator subject to the provisions of this subpart shall comply with the following test method and procedure requirements:

(a) Fugitive emission monitoring as required in § 60.482(f) shall comply with the following requirements.

(1) Monitoring shall comply with Reference Method 21.

(2) The VOC detection instrument shall meet the performance criteria of Reference Method 21.

(3) The instrument shall be calibrated before use on the day of its use by the methods specified in Method 21.

(4) Calibration gases shall be:

(i) Zero air (less than 3 ppm of VOC in air); and

(ii) A mixture of methane and air at a concentration of approximately 10,000 ppmv methane.

(5) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(b) When fugitive emission sources are tested for emissions having a concentration of less than 200 ppm above background as required in §§ 60.482 (a), (b), (c), and (f), the testing shall comply with the following requirements:

(1) The requirements of §§ 60.485(a) (1), (2), and (3) shall apply.

(2) The background level shall be determined, as set forth in Reference Method 21.

(3) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Reference Method 21.

(4) The provisions of § 60.8(f) do not apply to affected facilities subject to the provisions of this subpart.

(c) A fugitive emission source is in light liquid service if the following conditions apply:

(1) The vapor pressure of one or more of the components is greater than 0.3 kPa at 20°C. Vapor pressures may be obtained from standard reference texts or may be determined by ASTM Method D–2879.

(2) The total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20°C is equal to or greater than 10 percent by weight; and

(3) The fluid is a liquid at operating conditions.

(d) For purposes of determining the percent VOC in the process fluid within a fugitive emission source, procedures that conform to the general methods described in ASTM methods E–260, E–168, and E–169 shall be used.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 60.486 Recordkeeping requirements.

Each owner or operator subject to the provisions of this subpart shall comply with the following recordkeeping requirements.

(a) When each leak is detected as specified in §§ 60.482 (a), (b), (f), and (g); the following recordkeeping requirements apply:

(1) Weatherproof and readily visible identification, marked with the source identification number, shall be attached to the leaking source.

(i) The identification may be removed if the fugitive emission source has been monitored for two successive months as

specified in § 60.482(f)(3) and no leak has been detected during those two months.

(b) When each leak is detected as specified in §§ 60.482 (a), (b), (f), and (g), the following information shall be recorded in a log and shall be kept for two years in a readily accessible location:

(1) The instrument and operator identification numbers and the fugutive emission source identification number.

(2) The date the leak was detected and the dates of each attempt to repair the leak.

(3) Repair methods applied in each attempt to repair the leak.

(4) "Above 10,000" if the maximum VOC concentrations measured by the methods specified in § 60.485(a) after each repair attempt is greater than 10,000 ppm.

(5) "Repair delayed" if a leak is not repaired within 15 calendar days after discovery of the leak.

(6) The signature of the owner/operator whose decision it was that repair could not be effected without a process shutdown.

(7) The expected date of successful repair of the leak if a leak is not repaired within 15 days.

(8) The date of successful repair of the leak.

(c) The following information pertaining to the design requirements for closed vent systems, enclosed combustion devices, and vapor recovery systems required in §§ 60.482 (a) and (b) shall be recorded and kept in a readily accessible location:

(1) Detailed schematics, design specifications, and piping and instrumentation diagrams.

(2) The dates and descriptions of any changes in the design specifications.

(3) Periods when the enclosed combustion devices and vapor recovery systems required in §§ 60.482 (a) and (b) are not functioning as designed and dates of startups and shutdowns.

(d) The following information pertaining to all fugitive emission sources subject to the requirements in §§ 60.482 (a), (b), (c), and (f) shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for fugutive emission sources that are designated for emissions having a concentration of less than 200 ppm above background under the provisions of §§ 60.482 (a)(8), (b)(7), and (f)(7). The designation of these sources as subject to the requirements of §§ 60.482 (a)(8), (b)(7), or (f)(6) shall be signed by the owner or operator.

(2) A list of source identification numbers for safety/relief valves required by § 60.482(c) to meet no detectable emissions.

(3) The dates of each verification test for "no detectable emissions" status as determined by the methods specified in § 60.485(b).

(4) The background level measured during each verification test as required in § 60.485(b).

(5) The maximum VOC concentration measured at the source during each verification test as required in § 60.485(b).

(e) The following information shall be recorded in a log that is kept in a readily accessible location: (1) the design criterion required in § 60.482(a)(5) and § 60.482(b)(4), and (2) any changes to this criterion and the reasons for this change.

(f) The provisions of §§ 60.7(b) and (d) do not apply to affected facilities subject to the provisions of this subpart.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 60.487 Reporting requirements.

Each owner or operator subject to the provisions of this subpart shall comply with the following reporting requirements.

(a) A summary of the information recorded as required in § 60.486(b) shall be reported quarterly to the Administrator.

(b) Quarterly reports as required in § 60.487(a) shall be similar to the forms as shown in Figures 1, 2, 3, and 4 and shall include the following information:

(1) Process unit identification.

(2) Number of valves in the process unit excluding those designated for emissions having a concentration of less than 200 ppm above background under the provisions of § 60.482(f)(5).

(3) Number of valves for which leaks were detected by the monitoring method specified in § 60.485(a) during each month of the reporting quarter.

(4) Number of valves repaired.

(5) Number of valves not repaired within 15 days as required in § 60.482(f)(4).

(6) Reasons for non-repair of valves within 15 days as required in § 60.482(f)(4).

(7) Number of pumps for which leaks were detected during the reporting quarter as specified in §§ 60.482(a)(4) and (a)(5).

(8) Number of compressors for which leaks were detected during the reporting quarter as specified in § 60.482(b)(4).

(9) Statement signed by the owner or operator stating whether all provisions of 40 CFR 60 Subpart VV had been fulfilled during the reporting quarter.

(c) The provisions of § 60.8(d) do not apply to affected facilities subject to the provisions of this subpart.

(d) In the first report submitted as required in §§ 60.487(a), the report shall include a reporting schedule stating the months that quarterly reports shall be submitted. Subsequent reports shall be submitted according to that schedule unless a revised schedule has been submitted in a previous quarterly report.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

BILLING CODE 6560-26-M

Figure 1

QUARTERLY REPORT FOR PROCESS UNIT
FUGITIVE EMISSION SOURCES OPERATING UNDER THE
PROVISIONS OF 40 CFR Part 60, Subpart VV, §60.484(b)

Date_____

Company Name_____

Plant Location (City, State)_____

Mailing Address_____

_____

Telephone Number_____

Reporting Period_____

This report filed_____
(Process Unit Name)

Producing_____
(Chemical product(s))

EXAMPLE

Figure 2

SUMMARY STATISTICS FOR LEAK DETECTION
AND REPAIR REQUIREMENTS
OF 40 CFR Part 60, Subpart VV, §60.484(b)

1. Process Unit Name_____
(one report required for each affected facility)
2. Number of valves covered under the leak detection and repair program. _____
3. Number of valves found leaking during the reporting period. _____
4. Number of leaking valves repaired during the reporting period. _____
5. Number of pumps found leaking during the reporting period. _____
6. Number of compressors found leaking during the reporting period. _____

EXAMPLE

Figure 3

INFORMATION REQUIRED BY 40 CFR Part 60, Subpart VV, §60.484(b)(6)
FOR LEAKING VALVES NOT REPAIRED WITHIN 15 DAYS

1. Process Unit Name_____

2. Total number of valves not repaired within 15 days _____

3. Number of valves not repaired for the following reasons.

   (a) New parts required. _____

   (b) Off-line repair required. Critical, in-service valve. Bypass impossible. _____

   (c) Other (Explain reasons for non-repair) _____

4. Date of next schedule turn-around or shutdown _____

_____
Signature of Plant Manager
or Manager Designate

EXAMPLE

Figure 4

CERTIFICATION
AS REQUIRED IN §60.484(b)(10)

I hereby certify that process unit _____ owned (operated)
(Name)
by _____ located in _____
(company name) (city, state)
_____ operated in compliance with the
(has been/has not been)
requirements of Subpart VV, 40 CFR Part 60 which contains Standards of Performance for New Stationary Sources in the Synthetic Organic Chemical Manufacturing Industry.

All required equipment and control devices have been operated and maintained in compliance with the standards. All required work practices have been followed. Monitoring has been done as specified in Method 21. All required records have been made and are kept in _____
(location in plant)
_____ for review by EPA.

_____
(signature of owner or operator)

_____
(title)

_____
(date)

EXAMPLE

BILLING CODE 6560-26-C

4. By adding Reference Method 21 to Appendix A as follows:

Appendix A—Reference methods

* * * * *

Method 21. Determination of Volatile Organic Compound Leaks

1. *Applicability and Principle*

1.1 Applicability. This method applies to the determination of volatile organic compound (VOC) leaks from organic process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, and access door seals.

1.2 Principle. A portable instrument is used to detect VOC leaks from individual sources. The instrument detector is not specified, but it must meet the specifications and performance criteria contained in paragraph 2.1.

2. *Apparatus*

2.1 Monitoring Instrument. The monitoring instrument shall be as follows:

2.1.1 Specifications.

a. The VOC instrument detector shall respond to the organic compounds being processed. Detectors which may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

b. The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the applicable U.S.A Standards (e.g., National Electrical Code by the National Fire Prevention Association).

c. The instrument shall be able to measure the leak definition concentration specified in the regulation.

d. The instrument shall be equipped with a pump so that a continuous sample is provided to the detector. The nominal sample flow rate shall be 1–3 liters per minute.

e. The scale of the instrument meter shall be readable to ±5 percent of the specified leak definition concentration.

2.1.2 Performance Criteria. The instrument must meet the following performance criteria. The definitions and evaluation procedures for each parameter are given in Section 4.

2.1.2.1 The instrument response time must be 30 seconds or less. The response time must be determined for the instrument system configuration to be used during testing, including dilution equipment. The use of a system with a shorter response time than that specified will reduce the time required for field component surveys.

2.1.2.2 Calibration Precision: The calibration precision must be less than or equal to 10 percent of the calibration gas value.

2.1.2.3 Quality Assurance. The instrument shall be subjected to response time and calibration precision tests prior to being placed in service. The calibration precision test shall be repeated every 6 months thereafter. If any modification or replacement of the instrument detector is required, the instrument shall be retested and a new 6 month quality assurance test schedule will apply. The response time test shall be repeated if any modifications to the sample pumping system or flow configuration is made that would change the response time.

2.3 Calibration Gases. The monitoring instrument is calibrated in terms of parts per million by volume (ppmv) of the compound specified in the applicable regulation. The calibration gases required for monitoring and instrument performance evaluation are a zero gas (air, 3 ppmv VOC) and a calibration gas in air mixture approximately equal to the leak definition specified in the regulation. If cylinder calibration gas mixtures are used, they must be analyzed and certified by the manfacturer to be within ±2 percent accuracy. Calibration gases may be prepared by the user according to any accepted gaseous standards preparation procedure that will yield a mixture accurate to within ±2 percent. Alternative calibration gas species may be used in place of the calibration compound if a relative response factor for each instrument is determined so that calibrations with the alternative species may be expressed as calibration compound equivalents on the meter readout.

3. *Procedures*

3.1 Calibration. Assemble and start up the VOC analyzer and recorder according to the manufacturer's instructions. After the appropriate warmup period and zero or internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

If a dilution apparatus is used, calibration must include the instrument and dilution apparatus assembly. The nominal dilution factor may be used to establish a scale factor for converting to an undiluted basis. For example, if a nominal 10:1 dilution apparatus is used, the meter reading for a 10,000 ppm calibration would be set at 1,000. During field surveys, the scale factor of 10 would be used to convert measurements to an undiluted basis.

3.2 Individual Source Surveys.

3.2.1 Case I—Leak Definition Based on Concentration Value. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly probe the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading locations for approximately two times the instrument response time. If the maximum observed meter reading is greater that the leak definition in the applicable regulation, record and report the result as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

a. Valves—The most common source of leaks from valves is at the seal between the stem and housing. Place the probe at the interface where the stem exists the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where leaks can occur.

b. Flanges and Other Connections—For welded flanges, places the probe at the outer edge of the flange-gasket interface and sample around the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

c. Pumps and Compressors—Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within one centimeter of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage can occur.

d. Pressure Relief Devices—The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere for sampling.

e. Process Drains—For open drains, place the probe inlet at approximately the center of the area open to the atmosphere for sampling. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

f. Open-Ended Lines or Valves—Place the probe inlet at approximately the center of the opening to the atmosphere for sampling.

g. Seal System Degassing Vents and Accumulator Vents—Place the probe inlet at approximately the center of the opening to the atmosphere for sampling.

h. Assess Door Seals—Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

3.2.2. Case II-Leak Devinition Based on "NO Detactable Emission".

a. Determine the local ambient concentration around the source by moving the probe inlet randomly upwind and downwind at distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local ambient concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Note the ambient concentration and then move the probe inlet to the surface of the source and conduct a survey as described in 3.2.1. If a concentration increase greater than 2 percent of the concentration-based leak definition is obtained, record and report the results as specified by the regulation.

b. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

i. Pump or Compressor Seals—If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in 3.2.2.a.

ii. Seal system degassing vents, accumulator vessel vents, pressure relief

devices—If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur prior to the control device. If the required ducting or piping exists and there are no sources of where the emissions could be vented to the atmosphere prior to the control device, then it is presumed that no detectable emissions are present.

4. Instrument Performance Evaluation Procedures

4.1 Definitions.

4.1.1 Calibration Precision. The difference between the average VOC concentration indicated by the meter readout for consecutive repetitions and the know concentration of a test gas mixture.

4.1.2 Response time. The time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

4.2 Evaluation Procedures. At the beginning of the instrument performance evaluation test, assemble and start up the instrument according to the manufacturer's instructions for recommended warmup period and preliminary adjustments. If a dilution apparatus is used during field surveys, the evaluation procedure must be performed on the instrument-dilution system combination.

4.2.1. Calibration Precision Test. Make a total of nine measurements by alternately using zero gas and the specified calibration gas. Record the meter readings (example data sheet shown in Figure 21–1).

4.2.2 Response time Test Procedure. Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. Measure the time from concentration switching to 95 percent of final stable reading. Perform this test sequence three times and record the results (example data sheet given in Figure 21–2).

4.3 Calculations. All results are expressed as mean values, calculated by:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

Where:

x_i = VALUE OF THE MESUREMENTS.

Σ = Sum of the individual values.

$\pm$ = Mean value.

n = Number of data points.

BILLING CODE 6560-26-M

Instrument ID _____

Calibration Gas Data

Calibration = _____ppmv

Run No.	Instrument Meter Reading, ppm	Difference[1] ppm
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Mean Difference _____

$$\text{Calibration Error} = \frac{\text{Mean Difference}^{(2)}}{\text{Calibration Gas Concentration}} \times 100 \quad ____$$

[1] Calibration Gas Concentration - Instrument Reading

Figure 21-1. Calibration Error Determination

Instrument ID _____

Calibration Gas Concentration _____

90% Response Time:

1. _____ Seconds

2. _____ Seconds

3. _____ Seconds

Mean Response Time _____ Seconds

Figure 21-2. Response Time Determination

BILLING CODE 6560-16-C

5. By adding Appendix E as follows:

Appendix E—Synthetic Organic Chemicals Manufacturing Industry

OCPDB No.*	Chemical
20	Acetal.
30	acetaldehyde.
40	Acetaldol.
50	Acetamide.
65	Acetanilide.
70	Acetic acid.
80	Acetic anhydride.
90	Acetone.
100	Acetone cyanohydrin .
110	Acetonitrile.
120	Acetophenone.
125	Acetyl chloride.
130	Acetylene.
140	Acrolein.
150	Acrylamide.
160	Acrylic acid and esters.
170	Acrylonitrile.
180	Adipic acid.
185	Adiponitrile.
190	Alkyl naphthalenes.
200	Allyl alcohol.
210	Allyl chloride.
220	Aminobenzoic acid.
230	Aminoethylethanolamine.
235	p-Aminophenol.
240	Amyl acetates.
250	Amyl alcohols.
260	Amyl amine.
270	Amyl chloride.
[illegible]	Amyl mercaptans.
290	Amyl phenol.
300	Aniline.
310	Aniline hydrochloride.
320	Anisidine.
330	Anisole.
340	Anthranilic acid.
350	Anthraquinone.
360	Benzaldehyde.
370	Benzamide.
380	Benzene.
390	Benzenedisulfonic acid.
400	Benzenesulfonic acid.
410	Benzil.
420	Benzilic acid.
430	Benzoic acid.
440	Benzoin.
450	Benzonitrile.
460	Benzophenone.
480	Benzotrichloride.
490	Benzoyl chloride.
500	Benzyl alcohol.
510	Benzyl amine.
520	Benzyl benzoate.
530	Benzyl chloride.
540	Benzyl dichloride.
550	Biphenyl.
560	Bisphenol A.
570	Bromobenzene.
580	Bromonaphthalene.
590	Butadiene.
592	1-butene.
600	n-butyl acetate.
630	n-butyl acrylate.
640	n-butyl alcohol.
650	s-butyl alcohol.
660	t-butyl alcohol.
670	n-butylamine.
[illegible]	s-butylamine.
690	t-butylamine.
700	p-tert-butyl benzoic acid.
710	1,3-butylene glycol.
750	n-butyraldehyde.
760	Butyric acid.
770	Butyric anhydride.
780	Butyronitrile.
785	Caprolactam.
790	Carbon disulfide.
[illegible]	Carbon tetrabromide.
810	Carbon tetrachloride.
[illegible]	Cellulose acetate.
840	Chloroacetic acid.
[illegible]	m-chloroaniline.
[illegible]	o-chloroaniline.
870	p-chloroaniline.
[illegible]	Chlorobenzaldehyde.
890	Chlorobenzene.
900	Chlorobenzoic acid.
905	Chlorobenzotrichloride.
910	Chlorobenzoyl chloride.
920	Chlorodifluoroethane.
921	Chlorodifluoromethane.
930	Chloroform.
940	Chloronapthalene.
950	o-chloronitrobenzene.
951	p-chloronitrobenzene.
960	Chlorophenols.
964	Chloroprene.
965	Chlorosulfonic acid.
970	m-chlorotoluene.
980	o-chlorotoluene.
990	p-chlorotoluene.
992	Chlorotrifluoromethane.
1000	m-cresol.
1010	o-cresol.
1020	p-cresol.
1021	Mixed cresols.
1030	Cresylic acid.
1040	Crotonaldehyde.
1050	Crotonic acid.
1060	Cumene.
1070	Cumene hydroperoxide.
1080	Cyanoacetic acid.
1090	Cyanogen chloride.
1100	Cyanuric acid.
1110	Cyanuric chloride.
1120	Cyclohexane.
1130	Cyclohexanol.
1140	Cyclohexanone.
1150	Cyclohexene.
1160	Cyclohexylamine.
1170	Cyclooctadiene.
1180	Decanol.
1190	Diacetone alcohol.
1200	Diaminobenzoic acid.
1210	Dichloroaniline.
1215	m-dichlorobenzene.
1216	o-dichlorobenzene.
1220	p-dichlorobenzene.
1221	Dichlorodifluoromethane.
1240	Dichloroethyl ether.
1244	1,2-dichloroethane (EDC).
1250	Dichlorohydrin.
1270	Dichloropropene.
1280	Dicyclohexylamine.
1290	Diethylamine.
1300	Diethylene glycol.
1304	Diethylene glycol diethyl ether.
1305	Diethylene glycol dimethyl ether.
1310	Diethylene glycol monobutyl ether.
1320	Diethylene glycol monobutyl ether acetate.
1330	Diethylene glycol monoethyl ether.
1340	Diethylene glycol monoethyl ether acetate.
1360	Diethylene glycol monomethyl ether.
1420	Diethyl sulfate.
1430	Difluoroethane.
1440	Diisobutylene.
1442	Diisodecyl phthalate.
1444	Diisooctyl phthalate.
1450	Diketene.
1460	Dimethylamine.
1470	N,N-dimethylaniline.
1480	N,N-dimethyl ether.
1490	N,N-dimethylformamide.
1495	Dimethylhydrazine.
1500	Dimethyl sulfate.
1510	Dimethyl sulfide.
1520	Dimethyl sulfoxide.
1530	Dimethyl terephthalate.
1540	3,5-dinitrobenzoic acid.
1545	Dinitrophenol.
1550	Dinitrotoluene.
1560	Dioxane.
1570	Dioxolane.
1580	Diphenylamine.
1590	Diphenyl oxide.
1600	Diphenyl thiourea.
1610	Dipropylene glycol.
1620	Dodecene.
1630	Dodecylaniline.
1640	Dodecylphenol.
1650	Epichlorohydrin.
1660	Ethanol.
1661	Ethanolamines.
1670	Ethyl acetate.
1680	Ethyl acetoacetate.
1690	Ethyl acrylate.
1700	Ethylamine.
1710	Ethylbenzene.
1720	Ethyl bromide.
1730	Ethylcellulose.
1740	Ethyl chloride.
1750	Ethyl chloroacetate.
1760	Ethylcyanoacetate.
1770	Ethylene.
1780	Ethylene carbonate.
1790	Ethylene chlorohydrin.
1800	Ethylenediamine.
1810	Ethylene dibromide.
1830	Ethylene glycol.
1840	Ethylene glycol diacetate.
1870	Ethylene glycol dimethyl ether.
1890	Ethylene glycol monobutyl ether.
1900	Ethylene glycol monobutyl ether acetate.
1910	Ethylene glycol monoethyl ether.
1920	Ethylene glycol monoethyl ether acetate.
1930	Ethylene glycol monomethyl ether.
1940	Ethylene glycol monomethyl ether acetate.
1960	Ethylene glycol monophenyl ether.
1970	Ethylene glycol monopropyl ether.
1980	Ethylene oxide.
1990	Ethyl ether.
2000	2-ethylhexanol.
2010	Ethyl orthoformate.
2020	Ethyl oxalate.
2030	Ethyl sodium oxalacetate.
2040	Formaldehyde.
2050	Formamide.
2060	Formic acid.
2070	Fumaric acid.
2073	Furfural.
2090	Glycerol (Synthetic).
2091	Glycerol dichlorohydrin.
2100	Glycerol triether.
2110	Glycine.
2120	Glyoxal.
2145	Hexachlorobenzene.
2150	Hexachloroethane.
2160	Hexadecyl alcohol.
2165	Hexamethylenediamine.
2170	Hexamethylene glycol.
2180	Hexamethylenetetramine.
2190	Hydrogen cyanide.
2200	Hydroquinone.
2210	p-hydroxybenzoic acid.
2240	Isoamylene.
2250	Isobutanol.
2260	Isobutyl acetate.
2261	Isobutylene.
2270	Isobutyraldehyde.
2280	Isobutyric acid.
2300	Isodecanol.
2320	Isooctyl alcohol.
2321	Isopentane.
2330	Isophorone.
2340	Isophthalic acid.
2350	Isoprene.
2360	Isopropanol.
2370	Isopropyl acetate.
2380	Isopropylamine.
2390	Isopropyl chloride.
2400	Isopropylphenol.
2410	Ketene.
2414	Linear alkyl sulfonate.
2417	Linear alkylbenzene.
2420	Maleic acid.
2430	Maleic anhydride.
2440	Malic acid.
2450	Mesityl oxide.
2455	Metanilic acid.
2460	Methacrylic acid.
2490	Methallyl chloride.
2500	Methanol.
2510	Methyl acetate.
2520	Methyl acetoacetate.
2530	Methylamine.
2540	n-methylaniline.
2545	Methyl bromide.
2550	Methyl butynol.
2560	Methyl chloride.
2570	Methyl cyclohexane.
2590	Methyl cyclohexanone.
2620	Methylene chloride.
2630	Methylene dianiline.
2635	Methylene diphenyl diisocyanate.
2640	Methyl ethyl ketone.
2645	Methyl formate.
2650	Methyl isobutyl carbinol.
2660	Methyl isobutyl ketone.
2665	Methyl methacrylate.
2670	Methyl pentynol.
2690	α-methylstyrene.
2700	Morpholine.
2710	α-naphthalene sulfonic acid.
2720	β-naphthalene sulfonic acid.
2730	α-naphthol.
2740	β-naphthol.

OCPDB No.*	Chemical
2750	Neopentanoic acid.
2756	o-nitroaniline.
2757	p-nitroaniline.
2760	o-nitroanisole.
2762	p-nitroanisole.
2770	Nitrobenzene.
2780	Nitrobenzoic acid (o,m, and p).
2790	Nitroethane.
2791	Nitromethane.
2792	Nitrophenol.
2795	Nitropropane.
2800	Nitrotoluene.
2810	Nonene.
2820	Nonyl phenol.
2830	Octyl phenol.
2840	Paraldehyde.
2850	Pentaerythritol.
2851	n-pentane.
2855	1-pentene.
2860	Perchloroethylene.
2862	Perchloromethyl mercaptan.
2890	o-phenetidine.
2900	p-phenetidine.
2910	Phenol.
2920	Phenolsulfonic acids.
2930	Phenyl anthranilic acid.
2940	Phenylenediamine.
2950	Phosgene.
2960	Phthalic anhydride.
2970	Phthalimide.
2975	β-picoline.
2976	Piperazine.
3000	Polybutenes.
3010	Polyethylene glycol.
3025	Polypropylene glycol.
3063	Propionaldehyde.
3065	Propionic acid.
3070	n-propyl alcohol.
3075	Propylamine.
3080	Propyl chloride.
3090	Propylene.
3100	Propylene chlorohydrin.
3110	Propylene dichloride.
3111	Propylene glycol.
3120	Propylene oxide.
3130	Pyridine.
3140	Quinone.
3150	Resorcinol.
3160	Resorcylic acid.
3170	Salicylic acid.
3180	Sodium acetate.
3181	Sodium benzoate.
3190	Sodium carboxymethyl cellulose.
3191	Sodium chloracetate.
3200	Sodium formate.
3210	Sodium phenate.
3220	Sorbic acid.
3230	Styrene.
3240	Succinic acid.
3250	Succinonitrile.
3251	Sulfanilic acid.
3260	Sulfolane.
3270	Tannic acid.
3280	Terephthalic acid.
3290 and 3291.	Tetrachloroethanes.
3300	Tetrachlorophthalic anhydride.
3310	Tetraethyllead.
3320	Tetrahydronapthalene.
3330	Tetrahydrophthalic anhydride.
3335	Tetramethyllead.
3340	Tetramethylenediamine.
3341	Tetramethylethylenediamine.
3349	Toluene.
3350	Toluene-2,4-diamine.
3354	Toluene-2,4-diisocyanate.
3355	Toluene diisocyanates (mixture).
3360	Toluene sulfonamide.
3370	Toluene sulfonic acids.
3380	Toluene sulfonyl chloride.
3381	Toluidines.
3390, 3391, and 3393.	Trichlorobenzenes.
3395	1,1,1-trichloroethane.
3400	1,1,2-trichloroethane.
3410	Trichloroethylene.
3411	Trichlorofluoromethane.
3420	1,2,3-trichloropropane.
3430	1,1,2-trichloro-1,2,2-trifluoroethane.
3450	Triethylamine.
3460	Triethylene glycol.
3471	Triethylene glycol dimethyl ether.
3480	Triisobutylene.
3490	Trimethylamine.
3500	Urea.
3510	Vinyl acetate.
3520	Vinyl chloride.
3530	Vinylidene chloride.
3540	Vinyl toluene.
3541	Xylenes (mixed).
3560	o-sylene.
3570	p-xylene.
3580	Xylenol.
3590	Xylidine

*The OCPDB Numbers are reference indices assigned to the various chemicals in the Organic Chemical Producers Data Base developed by EPA.

[FR Doc. 81-89 Filed 1-2-81; 8:45 am]

BILLING CODE 6560-26-M

40 CFR Part 61

[AD-FRL 1610-3]

National Emission Standard for Hazardous Air Pollutants; Benzene Fugitive Emissions

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed Rule and Notice of Public Hearing.

SUMMARY: The proposed standard would limit benzene emissions from new and existing fugitive emission sources containing 10 or more percent by weight benzene in the petroleum refining and chemical manufacturing industries. The proposed standard would allow no detectable emissions due to leaks from safety/relief valves and product accumulator vessels; would require a leak detection and repair program for pipeline valves and existing pumps and compressors; and would require certain equipment for new pumps, new compressors, sampling connections, and open-ended valves.

The proposed standard implements the Clean Air Act and results from the Administrator's determination of June 8, 1977, that benzene presents a significant carcinogenic risk to human health and is, therefore, a hazardous air pollutant. The intent of the proposed standard is to protect the public health with an ample margin of safety.

A public hearing will be held to provide interested persons an opportunity for oral presentation of data, views, or arguments concerning the proposed standard for benzene fugitive emissions.

DATES: *Comments:* Comments must be received on or before April 6, 1981.

Public Hearing. A public hearing will be held on March 4, 1981 beginning at 9:00 a.m.

Request to Speak at Hearing. Persons wishing to present oral testimony should contact EPA at least one week before the hearing.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate, if possible) to: Central Docket Section (A-130), Attention: Docket No. A-79-27, U.S. Environmental Protection Agency, 401 M Street , S.W., Washington, D.C. 20460.

Public Hearing. The public hearing will be held at the EPA administration Bldg auditorium, Research Triangle Park, North Carolina. Persons wishing to present oral testimony should notify Ms. Naomi Durkee, Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5271.

Background Information Document. The background information document for the proposed standard is contained in the docket and may be obtained from the U.S. EPA library (MD-35), Research Triangle Park, North Carolina 27711, telephone number (919) 541-2777. Please refer to *Benzene Fugitive Emissions—Background Information for Proposed Standard (EPA-450/3-80-032a).* Other related documents which can be obtained from the same location include *Assessment of Health Effects of Benzene Germane to Low Level Exposures* (EPA-600/1-78-061); *Assessment of Human Exposures to Atmospheric Benzene* (EPA-450/3-78-031); and *Population Risk to Ambient Benzene Exposures: Final Report of the Carcinogen Assessment Group* (EPA-450/5-80-004).

Docket. Docket No. A-79-27, containing supporting information used in developing the proposed standard, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, Room 2903B, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460. Supplementary information on the regulation of benzene emissions can be obtained from the Maleic Anhydride Docket No. OAQPS-79-3, which is available for public review at EPA's Central Docket Section. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Ms. Susan R. Wyatt, Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5477.

SUPPLEMENTARY INFORMATION: Notice is hereby given that under the authority of Section 112(b)(1)(B) of the Clean Air Act the Administrator is proposing a national emission standard for benzene fugitive emissions. Although the proposed EPA *Policy and Procedures for Identifying, Assessing, and Regulating*

Airborne Substances Posing a Risk of Cancer (see 44 FR 58642) is not final, this proposed standard for benzene fugitive emissions has been developed consistent with the proposed EPA policy and procedures. As prescribed in Section 112(b)(1)(A) of the Act, the proposal of this standard was preceded by the Administrator's determination that benzene is a hazardous air pollutant as defined in Section 112(a)(1) of the Act. Accordingly, the Administrator revised the list of hazardous air pollutants on June 8, 1977, by adding benzene (42 FR 29332).

A background information document has been prepared that contains information on the potroleum refining and chemical manufacturing industries, the available control technologies for benzene fugitive emissions, and an analysis of the environmental, energy, economic, and inflationary impacts of regulatory alternatives. Information of the health effects of benzene is contained in other documents prepared by or for EPA. These documents can be obtained as indicated in the ADDRESSES section of this preamble.

Proposed Standard

The proposed standard would apply to new and existing pumps, pipeline valves, compressors, safety/relief valves, open-ended valves, sampling connections, pipeline flanges, and product accumulator vessels in benzene service at petroleum refineries and organic chemical manufacturing plants (excluding coke-oven by-product plants). Equipment components in benzene service are those containing materials having a benzene concentration of 10 or more percent by weight.

The proposed standard would limit leaks from safety/relief valves and product accumulator vessels to "no detectable emissions," that is, emissions having a concentration less than 200 parts per million (ppm) by volume above a background concentration as measured by proposed Reference Method 21 (40 CFR Part 60, Appendix A). Proposed Reference Method 21 measures organic chemicals, including benzene, but the method is not benzene-specific. Leaks from safety/relief valves during emergency conditions would be allowed but would be returned to no detectable emissions within five days of the emergency conditions.

The proposed standard would require that pipeline valves, existing pumps, and existing compressors in benzene service be monitored monthly for the detection of leaks by proposed Reference Method 21. However, valves that are found not to be leaking for two successive months could be monitored quarterly until a leak is detected. The proposed standard would require that any valve, existing pump, or existing compressor with a concentration at or above 10,000 ppm above background as measured by proposed Reference Method 21 be repaired within 15 days, except when repair would require a process unit shutdown. Repair means that the measured concentration is below 10,000 ppm. An initial attempt to repair such a leak would have to be made within 5 calendar days after the leak is detected. Valves, existing pumps, and existing compressors that can achieve a no detectable emission level, such as sealed bellows valves, would be exempted from monthly monitoring, but would have to be monitored on an annual basis to verify the no detectable emission level.

The proposed standard provides two alternative standards for pipeline valves in benzene service (i.e., containing 10 or more percent by weight benzene). After implementing the required leak detection and repair program (monthly monitoring) for one year, a plant owner or operator may request to use one of two alternative standards. The first alternative standard would be an allowable percentage of valves leaking. The second alternative standard would be a different leak detection and repair program. For this alternative standard, a plant owner or operator must demonstrate that the alternative leak detection and repair program achieves a percentage of valves leaking comparable to the required program. In either case, the alternative standard would be based on data collected during a 1-year implementation of the required leak detection and repair program. After a plant owner or operator requests the use of an alternative standard for valves, the Administrator would approve or disapprove the request within 90 days.

Additionally, the proposed standard would require that new pumps in benzene service use dual mechanical seal systems with a barrier fluid. In addition to mechanical seals, new compressors in benzene service would also be required to utilize a barrier fluid system. Degassing vents from barrier fluid systems would be required to be connected to a control device (e.g., an enclosed combustion device) by a closed vent system, and benzene concentration in the barrier fluid would be limited to less than 10 percent by weight. In addition, sensing devices would be required in order to detect failure of the seal systems. Pumps or compressors that can achieve no detectable emissions as measured by proposed Reference Method 21, such as canned motor pumps, diaphragm pumps, and magnetically coupled pumps, would be allowed but would be monitored on an annual basis to verify the no detectable emissions level.

Closed-loop sampling would be required by the proposed standard. The standard would require that material purged from sampling connections be returned to the process or collected in a closed disposal system without emissions to atmosphere. In-situ sampling would be excluded altogether from the proposed standard.

The proposed standard would require open-ended valves to be sealed with a cap, blind, plug, or second valve. The cap or other device could be removed or opened only when the open-ended valve is placed into service.

Sources excluded from routine monitoring and equipment requirements of the proposed standard include safety/relief valves in liquid service and flanges. If, however, leaks are visually or audibly detected from any source in benzene service, leak detection and repair requirements similar to those for pipeline valves would apply.

Compliance with the proposed standard would be assessed through review of records and reports which would document implementation of the requirements. On a quarterly basis, the owner or operator would report the number of leaks detected and repaired during the quarter. The owner or operator would also submit quarterly a signed statement stating whether provisions of the standard had been met.

Any owner or operator of a source designated by the proposed standard could request that the Administrator determine the equivalence of any alternative means of emission limitation to the equipment, design, operational and work practice requirements of the proposed standard. Upon receiving a request for determination of equivalence, the Administrator would provide an opportunity for public hearing. After such a hearing, the Administrator would make a decision and publish the decision in the **Federal Register.**

Summary of Environmental, Energy, and Economic Impacts

The proposed standard would reduce benzene fugitive emissions for existing petroleum refineries and chemical manufacturing units from about 8,300 megagrams per year to about 2,200 megagrams per year. As a result of this emission reduction, the proposed standard would reduce the estimated

maximum lifetime risk for the most exposed population from a range of 1.7×10^{-4} to $\times 10^{-3}$ at current controls, to a range of 4.6×10^{-5} to 32×10^{-5}, and would reduce the estimated incidence of leukemia deaths per year from new and existing plant exposure in the fifth year from a range of 0.21 to 1.4 at current controls, to a range of 0.6 to 0.4.

No significant adverse impacts to air quality, water quality, solid waste, energy, or noise are expected as a result of implementing the proposed standard for the existing industry. In fact, benefits to air and water quality would result because the controls utilized in implementing the standard would also reduce emissions of other potentially toxic hydrocarbons and because leak control techniques would reduce the amount of benzene and other organic compounds entering wastewater systems. Also, a positive energy benefit would result because leak control techniques increase conservation of process materials and thereby reduce the energy required to produce these materials.

The proposed standard is expected to affect about 250 existing petroleum refining and chemical manufacturing units. These units contain equipment that are assembled to produce benzene, benzene derivatives, or benzene-containing chemicals as intermediates or final products. The proposed standard would increase annualized costs to the existing petroleum refining and chemical manufacturing industries by about $2.1 million per year. In addition, the proposed standard would require a capital cost of $9.7 million. The increase in operating costs could be expected to increase the average cost of benzene derivatives by about 0.13 percent. There would be no plant closures or loss of employment as a result of implementing the standard.

The proposed standard would affect an estimated 70 new petroleum refining and organic chemical manufacturing units by 1985. The proposed standard would reduce benzene fugitive emissions from these new units from a possible level of 2,500 megagrams per year to 500 megagrams per year. The proposed standard for new facilities through 1985 would require a cumulative capital cost of $6.5 million for new facilities constructed through 1985. The proposed standard would increase annualized cost for new units in these industries by $1.3 million in 1985 and could increase the average cost of products from new facilities by about 0.30 percent.

Background Information on Health Effects of Benzene

The Administrator announced in the June 8, 1977, **Federal Register** (42 FR 29332) his decision to list benzene as a hazardous air pollutant under Section 112 of the Clean Air Act. A public hearing was held on August 21, 1980, to discuss the listing of benzene as a hazardous air pollutant. A hazardous pollutant is defined as an "* * * air pollutant to which no ambient air quality standard is applicable and which * * * may reasonably be anticipated to result in an increase in mortality or an increase in serious, irreversible, or incapacitating, reversible illness."

Numerous occupational studies conducted over the past 50 years have shown that health hazards result from prolonged inhalation exposure to benzene. Since 1900 the scientific and medical communities have recognized benzene as a toxic substance capable of causing acute and chronic effects. Benzene attacks the hematopoietic system, especially the bone marrow, and its toxicity is manifested primarily by alterations in the levels of the formed elements in the circulating blood (red cells, white cells, and platelets). The degree of severity ranges from mild and transient episodes to severe and fatal disorders. The mechanism by which benzene causes toxic effects is still unknown.

These adverse effects on the blood-forming tissues, including leukemia, have been documented in studies of workers in a variety of industries and occupations, including the manufacturing or processing of rubber, shoes, rotogravure, paints, chemicals, and more recently, natural rubber cast film. These studies include single case reports, cross-sectional studies, and retrospective studies of morbidity and mortality among a defined group of workers industrially exposed to benzene.

Based on the entire set of these studies, the Administrator concluded that benzene exposure is causally related to a number of blood disorders, including leukemia.* Although the studies which form the basis of this conclusion involve occupational exposure to benzene at higher levels than those found in the ambient air, the Administrator has "made a generic determination that, in view of the existing state of scientific knowledge, prudent public health policy requires that carcinogens be considered for regulatory purposes to pose some finite risk of cancer at any exposure level above zero" (44 FR 58646). Because of the widespread use of benzene, benzene emissions in the ambient air have been determined to result in significant human exposure. For these reasons, exposure to benzene emissions may reasonably be anticipated to result in one or more serious effects that can be expected to lead to an increase in mortality or an increase in serious, irreversible or incapacitating, reversible illness. Therefore, the Administrator concluded that benzene satisfies the definition of hazardous air pollutant under Section 112 of the Clean Air Act.

Rationale for Regulating Benzene Fugitive Emission Sources

Stationary source categories of benzene emissions include fugitive emissions from petroleum refineries and chemical manufacturing plants, the gasoline marketing system, process vents at several types of chemical manufacturing plants, coke-oven by-product plants, and benzene storage and handling facilities. Together, these five categories of stationary benzene emission sources account for national emissions of about 49,000 megagrams of benzene per year.

The first step in establishing standards for benzene was to determine which of the source categories emitting benzene would be regulated. Currently, there are about 130 petroleum refineries and organic chemical plants, which include about 250 units, involved in the production of benzene, benzene derivatives, and benzene-containing materials. These units emit about 8,300 megagrams per year of benzene from fugitive emission sources, or approximately 17 percent of the total benzene emissions from stationary sources. By 1985, 70 additional units are expected to be operating, which would increase the current benzene emission level from about 8,300 megagrams per year to a projected level of 10,800 megagrams of benzene per year if no additional controls are implemented. Although benzene emissions from some new and existing units will be regulated under separate emission standards, those standards would not regulate fugitive emissions of benzene, except fugitive emissions of benzene at coke-oven by-product plants, which will be covered under a separate standard for coke-oven by-product plants.

An estimated 65 million people live within 20 kilometers of the existing 250 units that produce or use benzene in the petroleum refining and chemical

* Benene also has been shown to be causally related to various cytopenias (decreased levels of formed element in the circulating blood), aplastic anemia (a non-functioning bone marrow), and potentially inheritable chromosomal aberrations.

manufacturing industries. This estimate is considered an estimate of the population at risk, i.e., the population exposed to ambient concentrations of benzene emissions from fugitive emission sources in those industries. As a result of exposure to these ambient benzene concentrations of benzene, the maximum lifetime risk was estimated to be within a range of 1.7×10^{-4} to 1.2×10^{-3} at current controls. This maximum lifetime risk is defined as the probability of dying of leukemia for an individual within the population at risk who is exposed continuously for 70 years to the highest maximum annual average ambient benzene concentration due to benzene emissions from fugitive emission sources. In addition, the number of people within the population at risk that would die from leukemia due to benzene exposure from fugitive emission sources in the existing industries was estimated to be within the range of 0.15 to 1.14 deaths per year.

Although the operational life of units which may be affected by this proposed standard is difficult to estimate, a 20-year operational life would be common to these industries. Operational lives of 50 years or more may occur particularly in the petroleum refining industry. However, operational lives may be less than 20 years for some chemical manufacturing industries. Consequently, a 20-year operational life is a reasonable estimate. On this basis, the number of deaths estimated to occur over the life of the 250 existing units would range from 3.5 to 23.5.

The ranges presented here include only the uncertainty of estimates made concerning the benzene concentrations to which workers were exposed in the occupational studies of Infante, Aksoy, and Ott, that were the basis for developing the benzene unit risk factor (discussed in Appendix E of "Benzene Fugitive Emissions—Background Information for Proposed Standard," EPA 450/3–800–32a) and are based on a 95 percent confidence interval that assumes the estimated concentrations are within a factor of two.

However, there are several other uncertainties associated with the estimated number of leukemia deaths that are not quantified in these ranges. The number of deaths were calculated based on an extrapolation of leukemia risk associated with a presumably healthy white male cohort of workers to the general population, which includes men, women, children, nonwhites, the aged, and the unhealthy. Uncertainty also occurs in estimating the benzene levels to which people are exposed in the vicinity of petroleum refining and chemical manufacturing plants. Furthermore, leukemia is the only health effect of benzene considered. Additionally, the benefits to the general population of controlling other hydrocarbon emissions from fugitive emission sources in these industries are not quantified. Finally, these estimates do not include the cumulative or synergistic effects of concurrent exposure to benzene and other substances. As a result of these uncertainties, the number of deaths and the maximum lifetime risk calculated around petroleum refining and chemical manufacturing plants could be overestimated. However, and more important, they could just as likely be underestimated for the same reasons.

Based on the magnitude of benzene exposures from emissions from this source category, on the resulting estimated maximum individual risks and estimated incidence of fatal cancers in the exposed population for the life of existing sources in the category, on the projected increase in benzene emissions as a result of new sources, and on consideration of the uncertainties associated with these quantitative risk estimates (including the effects of concurrent exposures to other substances and to other benzene emissions), the Administrator finds that benzene emissions from fugitive emission sources at petroleum refining and chemical plants create a significant risk of cancer and require the establishment of a national emission standard under Section 112.

The Administrator considered the alternative of taking no action to regulate benzene fugitive emissions and relying instead on the OSHA standard for benzene emissions and volatile organic compound (VOC) control under the State Implementation Plans (SIPs). The current OSHA standard stipulates a level of benzene that cannot be exceeded in the work place. Implementation of an emission standard under Section 112 of the Clean Air Act would require direct control of emissions sources by specific limits or other measures. Implementation of an OSHA benzene standard, on the other hand, requires indirect control of the emission sources. That is, OSHA standards require controls only to the extent necessary to reduce worker exposures to levels less than the maximum permissible exposure. Some fugitive emission sources can be located away from the workplace and, hence, may not require control. Therefore, OSHA standards may not require all emission sources to be controlled to a similar extent that an emission standard under Section 112 would require. Also, benzene fugitive emissions controlled to comply with an OSHA standard may be removed from the workplace but still be emitted to atmosphere. Relying on indirect control would be an unreasonable approach to reducing the public risks associated with fugitive emissions of benzene. In contrast, OSHA standards include requirements that regulate worker exposures that emission standards under Section 112 would not cover. Thus, establishment of both standards is appropriate and any redundancy would be superficial. Consequently, the Administrator rejected reliance on OSHA benzene regulations for control of benzene fugitive emissions.

Volatile organic compound emissions, as potential precursors to photochemical oxidant (ozone) formation, are now being regulated under SIPs. The goal of SIP regulations for VOC is to effect statewide compliance with the national ambient air quality standard (NAAQS) for ozone. Regulations under SIPs for reducing VOC emissions could also reduce benzene emissions. However, a particular State may not need to require reduction of VOC fugitive emissions to meet the NAAQS. Consequently, the Administrator rejected reliance on SIPs for control of benzene fugitive emissions.

Standards of performance for fugitive VOC emissions from new petroleum refineries and synthetic organic chemical manufacturing plants are currently being developed under Section 111 of the Clean Air Act. As discussed for SIP regulations, these new source performance standards (NSPS) for VOC emissions will effect some concurrent reductions in benzene emissions. However, since the standards would not apply to existing units and might not require a reduction of VOC emissions to the same extent as may be appropriate for benzene, the Administrator rejected reliance on NSPS for control of benzene emissions.

Thus, after considering the available alternatives, the Administrator determined that Section 112 of the Clean Air Act was the most reliable and expeditious mechanism for the control of benzene fugitive emissions. The Administrator, therefore concluded that a standard for the regulation of benzene fugitive emissions would be developed under the authority of Section 112.

Selection of Designated Sources

Benzene fugitive emissions occur in the petroleum refining and chemical manufacturing industries as a result of the production and use of materials that contain benzene. Benzene-containing

materials originate in several ways. In petroleum refineries, benzene is present in numerous process streams. It is present in crude oil in small concentrations and is formed in various refining operations such as pyrolysis and dealkylation. It is also present in many finished refinery products such as gasoline and aromatic products.

In the chemical industry, benzene is present in many processes because it is used in the manufacture of organic chemicals and because it is produced as a by-product in the manufacture of some organic chemicals. Benzene is used as a feedstock in the production of many chemicals, including, but not necessarily limited to, ethylbenzene, cumene, cyclohexane, benzene sulfonic acid, resorcinol, maleic anhydride, chlorobenzene, detergent alkylate, nitrobenzene, and hydroquinone. Additionally, benzene may be produced as a by-product in the manufacture of ethylene and styrene, or it may be produced as a pure product by extraction of mixed aromatics or hydrogenation of toluene.

Organic materials must be moved to and from various process vessels (reactors, distillation columns, etc.) in order to perform the chemical and physical changes required to manufacture a given organic product. These materials are normally moved from vessel to vessel through pipes. The materials are usually driven through the pipes by pumps, and the volume of flow is normally regulated by valves. Pipeline flanges (a method of joining sections of pipe), valves and pumps all require sealing mechanisms such as gaskets and packing glands to prevent leakage of process materials. These sealing mechanisms may develop leaks due to the wear of normal use and, in some cases, may be designed to leak. A small amount of leakage must be allowed for many sealing mechanisms used on rotating shafts in order to provide lubrication for the shaft. Because these sealing mechanisms allow leakage of benzene or benzene-containing materials to atmosphere, they are sources of benzene emissions.

In addition to the potential fugitive emissions resulting from leaks in sealing mechanisms, benzene may also be released during several other operations associated with the processing of organic compounds. Benzene can be released due to leaks in safety/relief valves; from purging, venting, and draining operations; and during product sampling operations. Benzene may also be released from cooling towers, wastewater separators, and process drains due to the leakage of organic materials into these systems.

A decision was made which defines the scope of the proposed standard. Present estimates indicate that 90 percent or more of the total benzene fugitive emissions arise from components which process materials containing 10 or more percent by weight benzene. Thus, the proposed standard would regulate the majority of benzene fugitive emissions if a 10 percent cutoff were applied. In addition, a 10 percent cutoff would eliminate covering trace quantities of benzene, such as those found in crude oil. Therefore, it was decided that the proposed standard would be applied only to fugitive emission sources in benzene service, i.e., those components containing materials of 10 or more percent by weight benzene. However, if information becomes available that indicates that benzene emissions from fugitive emission sources which handle benzene streams below the 10 percent cutoff are greater than presently estimated, the standard could be revised in the future.

An emission standard promulgated under Section 112 of the Clean Air Act covers new and existing stationary sources of a hazardous air pollutant, such as benzene. The coverage of an emission standard depends on the specific definition of stationary source designated for any particular emission standard. A new source includes an existing source which has been modified. In general, an existing source is modified if a change in the source results in increased emissions. New and existing sources covered by Section 112 have different compliance schedules, and, in some cases, new sources may be covered by a more restrictive standard than the standard for existing sources. The designation of fugitive emission sources to be covered by the proposed emission standard was chosen such that the proposed standard would have maximum effectiveness in reducing benzene fugitive emissions from new and existing sources, yet would not cause excessive adverse impacts.

Three possible definitions for the designated sources were considered before making a selection. These were (1) designating all fugitive emission sources within an entire plant site (e.g., an entire refinery or chemical plant) as the source, (2) designating all fugitive emission sources within a process unit (e.g., an alkylation unit or a nitration unit) as a source, and (3) designating each fugitive emission source such as a pump, a valve, or a pipeline flange, as a source.

A plant site consists of all chemical manufacturing and petroleum refining benzene process units under common ownership at the same geographical location. All fugitive emission sources in benzene service at one geographical location could be designated as the source to be covered by the proposed standard. However, entire plant sites are not typically constructed. More typically, a new production unit would be added to an existing site to produce a new product, or larger capacity equipment might be installed to increase production of an existing product. Thus, the effectiveness of the proposed standard would be limited to a standard for existing plant sites or plant sites that would become new plant sites through reconstruction or modification.

If the standards for new and existing fugitive emission sources are identical, then an existing plant site that would become a new source through reconstruction or modification would not be required to comply with any different requirements (except compliance date requirements). If the standard for new sources is more restrictive than the standard for existing sources, then an existing plant site that might become a new source through reconstruction or modification would be required to retrofit additional controls to all fugitive emission sources at that plant site. This could have adverse impacts, especially if the new source standard would require extensive retrofitting. These adverse impacts would be related generally to cost and economic impacts associated with retrofitting an entire plant site. In contrast to these adverse impacts, positive impacts in reducing benzene emissions could be associated with retrofitting an entire plant site.

The designated sources could also be defined as process units. Process units would be considered to be all the fugitive emission sources in benzene service assembled to manufacture benzene, benzene derivatives, or benzene-containing compounds as intermediates or final products. Designating the source as a process unit would have the same impacts as designating the source as a plant site but to a lesser extent. If the standard for new sources is more restrictive than for existing sources, then an existing process unit that might become a new source through reconstruction or modification would be required to retrofit the additional controls. Even though this could have adverse impacts, the impacts would not be as substantial as those if the source were designated as a plant site. In addition, positive emission reduction impacts could result.

Benzene fugitive emission sources could be designated as individual pieces of equipment, such as pumps and valves, that leak benzene or benzene-containing materials, thereby generating benzene emissions to atmosphere. The key factor common to benzene fugitive emissions are directly related to the number of leaking components, but they are not necessarily related to the type of process unit in which the components are found.

If the standard is not different for new and existing fugitive emission sources, then an existing individual component that might become a new source through reconstruction or modification would not be required to comply with any different requirements. However, approval of construction or modification as required in 40 CFR 61.05(a) for each modification or replacement would generally be required. This would require the identification of each component. However, individual components containing at least 10 percent benzene would be identified in such a manner that they would not be confused with components containing less than 10 percent benzene. Thus, the identification of each component for purposes of modification and reconstruction would not be an additional requirement. This procedure would be the same for process units and plant sites.

If the standard for new sources is more restrictive than the standard for existing sources, then existing individual components that might become new sources through reconstruction or modification would be required to retrofit the additional controls to the existing source. In general, this would not happen through modification because most changes in individual pieces of equipment would not increase their emission rates. However, an existing component could become a new source if it were reconstructed or replaced. Cost and economic impacts associated with retrofitting existing sources when they become new sources through modification or reconstruction would be minimized if the sources are designated as individual components. This would occur since replacement of an existing component that becomes a new source would not affect other components. Individual components containing at least 10 percent benzene would be identified in such a manner that they would not be confused with components containing less than 10 percent benzene. In addition, they could be clearly identified as either an existing source or a new source. Identifying existing and new individual components could be difficult but would not be burdensome because both new and existing components would be covered. The only difference would be the requirements of the applicable standard. However, approval of construction or modification for each modification or replacement would generally be required.

The adverse impacts associated with potentially extensive retrofitting of existing plant sites would prohibit the designation of the sources covered by the standard as plant sites. Even though designating the sources covered by the standard as process units would result in less adverse impacts than designating the sources as plant sites, this approach could have adverse impacts. These impacts are minimized by designating the sources as individual components. Thus, because adverse impacts are minimized by designating the sources covered by the standard as individual components, the Administrator has designated individual components as the sources covered by the proposed standard. As a result of this decision, however, the modification and construction approval provisions of 40 CFR Part 61 were reviewed.

Modification is not likely to result in existing sources becoming new sources because, in general, such changes do not increase the emission rate from the source. On the other hand, replacement of a source would essentially be construction of a new source. A definition of reconstruction is being proposed with this standard. The purpose of the application of modification or construction provisions in the General Provisions of 40 CFR Part 61 is to provide EPA with information on new sources and to ensure that new sources comply with the standard. Replacement of existing fugitive emissions sources that comply with the standard for new sources does not warrant a review and subsequent approval of construction. Thus, the Administrator has excluded from approval of construction or modification existing sources that become new sources through reconstruction and that comply with the standard for new sources. However, a notification of the replacement or reconstruction would be reported in the quarterly report that occurs immediately after the reconstruction or modification.

According to the definition of reconstruction which is contained in the proposed standard, there are two criteria which the Administrator will consider in deciding whether a source is reconstructed. The first is that "the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable, entirely new source." The second is that "it is feasible, considering economic impacts and the technological problems associated with retrofit, to meet the applicable standard for new sources set forth in this subpart." The second criterion is only meaningful to portions of the proposed standard which have different requirements for new and existing sources. That is, for any existing source that has the same requirements as a new source, the economic impacts and technological problems associated with retrofit have already been considered. For those existing sources, it has already been decided that they can meet the proposed standard for new sources.

In developing the proposed standard, 13 types of individual process components have been identified as potential sources of benzene fugitive emissions. These components are pumps, pipeline valves, safety/relief valves, open-ended valves, sampling connections, flanges, process drains, compressors, product accumulator vessels, agitators, wastewater separators, cooling towers, and process unit turnarounds.

Four of these types of process components are not included in the proposed standard. At present no data are available that indicate the extent of benzene emissions or emission reduction techniques for wastewater separators, cooling towers, and process unit turnarounds. If information becomes available that indicates the extent of emissions from these sources, standards could be proposed for them in the future. Agitators are not considered to be a significant source of benzene fugitive emissions. Agitated vessels in benzene operations operate at atmospheric pressure; consequently, no leakage is expected at the seal. For pumps, pipeline valves, safety/relief valves, open-ended valves, sampling connections, flanges compressors, and product accumulator vessels, information indicating the extent of benzene emisssions and available control technology are available. Therefore, all except four of these types of equipment have been included in the scope of the proposed standard.

In summary, the sources designated to be covered by the proposed standard are pieces of equipment of the following types that contain fluids (liquid or gas) with a concentration of 10 or more percent by weight benzene: pumps, pipeline valves, safety/relief valves, open-ended valves, sampling connections, pipeline flanges,

compressors, and product accumulator vessels.

Selection of Regulatory Alternatives

Benzene fugitive emissions can be reduced by two types of control techniques: (1) leak detection and repair programs, and (2) equipment, design, and operational requirements. Six regulatory alternatives which would achieve different levels of emission reduction where developed by employing various combinations of the available control techniques.

Control Techniques

The leak detection and repair programs included in the various regulatory alternatives consist of two phases. The initial phase involves monitoring potential fugitive emission sources to detect fugitive emissions. After detection of the leak, the fugitive emission source would be repaired or replaced in order to reduce the emissions.

Several leak detection methods were considered in the development of the regulatory alternatives. Methods considered included the use of VOC detectors and soap bubble solutions to locate leaking fugitive emission sources. Different modes of monitoring were also considered. Included were periodic monitoring for leaking fugitive emission sources on an individual component or an area basis and continuous automatic instrument monitoring of background air at multiple sites within a facility. As detailed in the Selection of Test Method section of this preamble, the individual component survey using a portable VOC detector has been selected as the leak detection method for the proposed standard. This method requires that the VOC concentration at the surface of each fugitive emission source be monitored with a portable VOC detector.

The effectiveness of an individual source leak detection program would depend not only on the detection method, but also on other factors. For example, more frequent monitoring would allow more frequent maintenance and a corresponding reduction in fugitive emissions. The selection of the level at which a leak is defined also influences the potential effectiveness of a leak detection and repair program. Other factors such as the length of time allowed between detection and repair of a leak also influence the emission reduction achievable by a leak detection and repair program.

The second phase of a leak detection and repair program consists of repair or replacement of leaking fugitive emission sources. Repair or replacement of a fugitive emission source would be required within a specified period of time after the detection of a VOC concentration equal to or in excess of a predetermined level. These repair and repacement procedures would vary for each fugitive emission source. Fugitive emissions from packed seals on a pump or compressor, for example, could be reduced by tightening the packing gland. However, the packing could deteriorate to a point where further tightening would no longer reduce emissions, but instead would increase the emission rate. At this point, the packing would have to be replaced. Mechanical seals on pumps and compressors would need to be removed for repair. Replacement of these seals would be included in their repair, if necessary.

Most valve leaks can be repaired while the equipment is in service. Most process valves have a packing gland which could be tightened while the valve is in service. Tightening of the packing gland would normally reduce fugitive emissions from a leaking valve. If the packing is old and brittle or if the packing were to be overly tightened, the emission rate could increase. When this occurs, the packing would have to be replaced. Plug valves may be repaired by addition of grease.

Some valves can not be repaired while in service. These valves include control valves, which may be excluded from in-service repair by operating or safety considerations, and block valves, whose removal for repair or replacement might require a process shutdown. Other valves, such as control valves with a manual bypass loop, can be isolated for repair or removal. The repair of a leaking safety/relief valve normally requires that it be removed from service.

Leaks from flanges can often be reduced by tightening the flange bolts. Most flanges can not be isolated from the process to permit replacement of the gasket.

In addition to a leak detection and repair program, certain equipment can be used to reduce fugitive emissions. Possible types of equipment for controlling emissions were considered for the following source types in the development of the regulatory alternatives: pumps, compressors, safety/relief valves, open-ended valves, sampling connections, process drains, and product accumulator vessels.

Fugitive emissions from pumps occur primarily at the pump seal. These emissions could be reduced by elimination of the seal by replacing the pump with a sealless pump, use of an improved seal (e.g., double mechanical seals), or collection and control of the emission with closed vent system.

Because of process condition limitations, sealless pumps are not suitable for all pump applications. However, dual mechanical seals are currently used in many process applications. These seals characteristically include a barrier fluid between the seals. If the pressure in the barrier fluid system is higher than that in the pump seal area, benzene would not leak from the seal. If, however, the pressure in the pump seal area is higher than the barrier fluid pressure, benzene could leak into the barrier fluid and could be emitted to atmosphere through degassing vents the barrier fluid reservoir. Connecting the degassing vents to a control device (enclosed combustion or vapor recovery system) and maintaining the benzene concentration in the barrier fluid below 10 percent by weight could effectively control fugitive emissions originating from the dual mechanical seals. The control efficiency would vary with the condition of the mechanical seals and the type of control device used, but control efficiencies approaching 100 percent can be achieved.

Emissions from compressors also occur primarily at the seal. A closed vent system or replacement of the seal with an improved seal (mechanical) could be used to reduce emissions from compressors. The use of mechanical seals on compressors, connection of the barrier fluid reservoir to a control device (enclosed combustion or vapor recovery system) with a closed vent system, and maintaining the benzene concentration in the barrier fluid below 10 percent by weight could provide control efficiencies approaching 100 percent.

Safety/relief valves may emit benzene fugitive emissions due to the failure of valve seating surfaces, improper resating after relieving, or process operation near the relief valve set point. Equipment for controlling fugitive emissions from relief valves include closed vent systems connected to a control device or rupture disks upstream of these valves. A closed vent system can be used to transport the relief valve discharge (and fugitive emissions) to a control device. These types of systems are currently used in petroleum refinery and organic chemical process units; however, under certain applications, such as combustion of halogenated compounds, these systems could result in undersirable emissions.

The control efficiency of a closed vent and control device system is mostly dependent on the effectiveness of the control device. For example, a typical flare is about 60 to 90 percent effective for organic compound destruction, and a

closed vent system is about 100 percent effective in organic compound capture; thus, the overall efficiency is about 60 to 90 percent.

Rupture disks can be installed upstream of safety/relief valves to prevent fugitive emissions from the valve seat. Unlike a closed vent system, a rupture disk does not require a downstream control device. Therefore, the control efficiency is approximately 100 percent.

When process samples are taken for analysis, obtaining a representative sample requires purging some process fluid through the sample connection. This sample purge would be vented to atmosphere if the fluid is gaseous, and liquid sample purges could be drained onto the ground or into open collection systems where evaporative emissions would result. Fugitive emissions from sampling connections can be reduced by using a closed loop sampling system that eliminates purging of process material.

Fugitive emissions from open-ended valves can be controlled by installing a cap, plug, blind, or second valve on the open end of the valve. These equipment specifications, capping of open-ended valves and closed-loop sampling, represent readily available technologies that have been applied in the industry and exhibit control efficiencies of approximately 100 percent. The actual control efficiencies will depend on site-specific factors.

Fugitive emissions from process drains can be controlled by three methods. First, if drain traps have been installed in the process drain system, then regular flushing of process drains to prevent the build up of benzene-containing organic compounds can effectively reduce fugitive emissions from these sources. Second, sealed drain covers may be installed so that benzene emissions from process drains could not occur. The effectiveness of either of these techniques, however, would depend on the degree of control of other sources in the drain systems such as drain vents and wastewater separators. Thus, another method for controlling fugitive emissions from process drains is to minimize the potential for benzene leakage into the drain system. This is done by minimizing the potential for leakage from other sources such as sampling systems, open-ended valves, and pumps. When the degree of control for these sources is maximized, as discussed above, then their potential for leakage into the drain system will be minimized and the potential for benzene fugitive emissions from the drain system will, likewise, be minimized.

Fugitive emissions from product accumulator vessels (e.g., distillate receiver vessels) occur through the vessel vents. Where a vent is employed, it may discharge directly to atmosphere or indirectly to atmosphere through a vacuum system. Most accumulator vessels in refineries are presently controlled. The vent discharge can be collected by a closed vent system and destroyed by an enclosed combustion device.

Regulatory Alternatives

Six regulatory alternatives of increasing emission reduction efficiency were developed by employing various combinations of the available control techniques. These regulatory alternatives were then analyzed to determine which would serve as the basis of the proposed standard for new and existing sources.

Regulatory Alternative I represents a baseline alternative. The baseline regulatory alternative describes the industry in the absence of new regulations, and it provides the basis for incremental comparison of the impacts of the other regulatory alternatives.

A number of factors influence the baseline emission level. Examination of benzene control programs at individual plants reveals a range of existing control levels. Many plants rely on normal maintenance procedures to control fugitive emissions due to large leaks. Other plants may have developed a leak detection and repair program in response to OSHA regulation requirements, State or local agency regulations, or emission offset provisions. To characterize baseline conditions, however, a general description of the entire industry is desirable, rather than a description of site-specific or geographic-specific conditions. Thus, Regultory Alternative I reflects existing plant maintenance procedures as characterized by emission factors developed from recent studies of fugitive emission sources.

Regulatory Alternative II would require periodic leak detection and repair for most sources and the installation of equipment for other sources and would reduce benzene fugitive emissions by about 60 percent. The requirements of this regulatory alternative are based upon the recommendations of the refinery VOC leak control techniques guideline (CTG) document (EPA–450/2–78–0[illegible]6). Quarterly monitoring for leaks from relief valves, pipeline valves and open-ended valves in gas service, and compressors would be required. Pumps, drains, and valves in liquid service would be required to be monitored annually for leaks. Weekly visual inspections of pump seals would be required; visual detection of a liquid leak would direct that monitoring be initiated to determine if the action level were being exceeded and that the pump seal be subsequently repaired, if necessary. Relief valve monitoring would also be required after over pressure relieving, to detect improper reseating. Finally, open-ended valves would be required to be sealed with a cap, blind, plug, or another valve.

Regulatory Alternative III would provide for more effective control than Regulatory Alternative II by increasing the frequency of leak detection and repair for some sources and requiring the installation of certain equipment for other sources. Regulatory Alternative III would reduce benzene fugitive emissions by about 70 percent. Monthly monitoring for detection of leaks from pumps, compressors, drains, and valves would be required in this regulatory alternative. The purpose of the increased frequency of monitoring is to reduce emissions from residual leaking sources; i.e., those sources that are found leaking and are reparied and then recur before the next inspection, and those sources that begin leaking between inspections.

Regulatory Alternative III would also require the installation of certain equipment. Regulatory Alternative III is based on installation of closed-loop sampling systems; rupture disks on gas service relief valves that vent to atmosphere; accumulator vessel vents tied into a control device; and open-ended valves sealed with a cap, blind, plug, or another valve. Based on a preliminary cost analysis, each of these controls is expected to have similar costs for the amount of benzene emissions reduced.

Regulatory Alternative IV includes equipment that is expected to have greater costs for the amount of benzene emissions reduced than those included in Regulatory Alternative III. Regulatory Alternative IV would reduce benzene fugitive emissions by about 80 percent. Regulatory Alternative IV is based on mechanical seal systems on pumps and compressors, in addition to the other equipment included in Regulatory Alternative III. Diaphragm and sealed-bellows valves were not included because the expected cost for the amount of benzene emissions reduced, based on a preliminary cost analysis, was much greater than for double mechanical seal systems. In addition, drains and valves would be required to be monitored for leaks each month, as in Regulatory Alternative III.

Regulatory Alternative V would require leakless emission control equipment for all designated sources and would reduce benzene fugitive emissions by about 90 percent. In addition to the equipment discussed for Regulatory Alternative IV, this regulatory alternative would require installation of diaphragm or sealed-bellows type valves, and would require drains to be enclosed. Consequently, all designated sources would be controlled to the maximum degree, and leaks would virtually be eliminated from these sources. Equipment would be required to be monitored annually for leaks to ensure continued leakless operation.

Regulatory Alternative VI would require the elimination of all benzene fugitive emissions from the source category. Although the equipment upon which Regulatory Alternative V is based would virtually eliminate benzene emissions from equipment handling greater than 10 weight percent benzene, there would still be some benzene emissions from spills and occasional equipment failure.

The use of substitute feedstocks could eliminate all benzene from some operations; for example, n-butane could be used in the production of maleic anhydride instead of using benzene. However, this approach could not be used for all benzene-consuming processes, as there are no substitutes for benzene in some cases. Therefore, this approach is best considered on a case-by-case process standard basis.

The only approach that could totally eliminate benzene fugitive emissions is the prohibition of all benzene-producing and consuming processes. However, this approach would lead to the shutdown of all refineries and a number of chemical plants because benzene is present in most refinery feedstocks and organic chemical process streams. This approach is considered unreasonable because the economic impacts, although difficult to quantify, would be extremely adverse to the benzene-producing and consuming industries and, consequently, the public.

Selection of the Basis for the Standard—Existing Sources

Selection of a regulatory alternative to serve as the basis for the proposed standard for existing sources involved evaluating the environmental and economic impacts of each alternative discussed in Selection of Regulatory Alternatives. Included for the evaluation of environmental impacts were estimates of air quality, water, noise, and solid waste impacts. Included for the evaluation of economic impacts were estimates of the total capital and annualized costs for implementing each alternative, estimates of the effect on final product prices, and estimates of energy impacts.

After consideration of the environmental, energy, and economic impacts of each alternative, one alternative was selected as best available technology (BAT) for existing sources. After BAT was identified, the estimated risks remaining after application of BAT were examined to determine whether they are unreasonable in view of the health benefits and other impacts that would result if a more stringent option were applied.

To assess the environmental impacts of the regulatory alternatives, existing conditions were first characterized (Regulatory Alternative I). Then incremental impacts were determined from this level of control.

Three model units were chosen to represent average inventories of equipment handling process streams containing greater than 10 weight percent benzene. These model units were developed by analyzing various production operations that are presently known to involve benzene fugitive emissions. The model units are based on the number of pieces of equipment involved in the various production operations because fugitive emissions are proportional to the number of pieces of equipment. Thus, the model units generally reflect process complexity rather than production rate.

Model Unit A represents an average inventory for units involved in the production of ethylbenzene, styrene, cumene, cylohexane, benzene sulfonic acid, resorcinol, benzene from toluene, or maleic anhydride; Model Unit B represents an average inventory for units involved in the extraction of benzene from reformate, or in the production of chlorobenzene or linear alkylbenzene; Model Unit C represents an average inventory for units involved in the production of nitrobenzene, hydroquinone, or benzene by extraction from pyrolysis gasoline. Ethylene production may be represented by either Model Unit A, B, or C, depending on the number of ethylene production units at the plant site; one ethylene unit would be represented by Model Unit A, two or three ethylene units would be represented by Model Unit B, and four or five ethylene units would be represented by Model Unit C. The 1980 industry totals for these model units were estimated to be: Model Unit A, 145 units; Model Unit B, 72 units; Model Unit C, 24 units.

Air Quality Impact

Using baseline emission factors and the equipment inventories developed for the model units, baseline benzene fugitive emissions were determined to be about 19 Mg/year for Model Unit A, 45 Mg/year for Model Unit B, and 97 Mg/year for Model Unit C. These rates multiplied by the number of each model unit present in the existing industry yield a nationwide unregulated total of 8,300 Mg/year.

Regulatory Alternative II would reduce benzene fugitive emissions from the existing industry from 8,300 Mg/year to 3,600 Mg/year, yielding a 57 percent reduction in emissions. Regulatory Alternative III would reduce these emissions to 2,200 Mg/year, yielding a 73 percent reduction. Regulatory Alternative IV would reduce emissions to 1,900 Mg/year, yielding a 77 percent reduction. Regulatory Alternative V would reduce emissions to 900 Mg/year, yielding a 90 percent reduction in emissions from the baseline.

Ambient benzene concentrations attributable to uncontrolled benzene fugitive emissions (Regulatory Alternative I) and those attributable to fugitive emissions reduced to the levels required by Regulatory Alternatives II through V were estimated. The estimated maximum annual average benzene concentration for the facility with the highest expected benzene fugitive emission rate was 13.4 parts per billion by volume (ppbv) at a distance of 0.1 kolometer from the plant. The maximum annual concentrations for this plant under Regulatory Alternatives II through V were 5.9, 3.6, 3.1, and 2.8 ppbv. All of these maximum annual concentrations occurred at 0.1 kilometer from the plant.

Water, Solid Waste, and Noise Impacts

Since none of these regulatory alternatives would require any additional water discharges, there would be no negative impact on water quality. There is potential for a positive benefit to water quality, however, due to decreased amounts of organic materials entering drains, sewers, and wastewater discharges because of better leak control. This benefit would increase with the stringency of the regulatory alternative because each successive regulatory alternative requires additional leak control measures.

There would be minimal impact on solid waste and no impact on noise as a result of implementing any of the regulatory alternatives. The solid wastes associated with the regulatory alternatives are replaced mechanical seals, packing, rupture disks, and

valves. The quantities of waste to be disposed are not expected to be significant for any of the regulatory alternatives.

Energy and Economic Impacts

The industry total capital and annualized costs, including recovery credits, can be summarized as follows for Regulatory Alternatives II, III, IV, and V: (1) Regulatory Alternative II would require a total capital investment of $2.9 million and would result in an annualized savings of $25 thousand; (2) Regulatory Alternative III would require a capital investment of $9.7 million and an annualized cost of $2.1 million; (3) Regulatory Alternative IV would require a capital investment of $25.3 million and an annualized cost of $5.5 million; (4) Regulatory Alternative V would require a capital investment of $242 million and an annualized cost of $58.6 million. The annualized costs required to implement Regulatory Alternatives II, III, IV, and V could cause the average price of benzene derivatives to rise by about 0.04, 0.13, 0.37, and 4.1 percent, respectively.

Since the controls required to implement the regulatory alternatives are passive in nature, there would be no negative energy impact. In fact, there would be a slight energy benefit from the conservation of raw materials and products that results from the control of leaks.

In selecting best available technology (BAT) for existing sources, the Administrator reviewed technology to determine the most advanced level of controls adequately demonstrated, considering economic, energy, and environmental impacts, and the technological problems associated with retrofit. First, Regulatory Alternative VI was examined. This regulatory alternative would eliminate benezene fugitive emissions from the industries. However, it would result in closure of a number of industries. Thus, the Administrator did not select Regulatory Alternative VI as the basis for BAT because the closure of these industries would result in extremely adverse economic impacts.

Second, Regulatory Alternative V was examined. This alternative would require the most advanced level of controls without shutdown of any industries. The main difference between this regulatory alternative and the less stringent alternatives is that it would require replacement of existing valves with new leakless valves. Replacing existing valves with leakless valves could result in retrofit problems. For example, in some cases, replacing the valves would increase the pressure drop in the system, and possibly result in reduction in throughputs and/or redesign of the system. Regulatory Alternative V would also result in replacement of some existing pumps with new pumps and replacement of some relief valves with new relief valves, but these replacements would also be required by some of the other alternatives. This regulatory alternative would result in a 7,400 megagram per year reduction in benzene emissions from the baseline for existing plants. Capital cost for this alternative would be $242 million, and the annualized cost would be $58.6 million. Regulatory Alternative V could result in cumulative percent price increases for benzene-derivative products from about 2 percent to about 7 percent. Even if the price increase for benzene production is not passed through to benzene-derivative products, this alternative could still result in price increases of greater than 5 percent for several specialty products made from benzene. Because the implementation of Regulatory Alternative V would result in substantial price increases which could cause adverse economic impacts, the Administrator examined Regulatory Alternative IV before selecting BAT.

Regulatory Alternative IV would require the next most advanced level of controls to the levels for Regulatory Alternative V and would result in a 6,400 megagram per year reduction in benzene emissions. This alternative would require replacement of some equipment. However, this replacement would not be as extensive as that in Regulatory Alternative V, and the technological problems and costs associated with this retrofitting would be reduced accordingly. Regulatory Alternative IV would result in cumulative percent price increases of less than 1 percent for all affected chemicals. Capital costs would be about $25.3 million, and annualized costs would be about $5.5 million.

The Administrator compared the level of controls for Regulatory Alternative V and Regulatory Alternative IV and their economic impacts before selecting BAT. The level of controls for Regulatory Alternative V would result in an additional 1,000 Mg/year emission reduction compared with Regulatory Alternative IV. In contrast to this impact, Regulatory Alternative V would result in much greater economic impacts than Regulatory Alternative IV. The cumulative percent price increases associated with Regulatory Alternative V, which could be as high as 7 percent for some products, could result in significant adverse impacts. Thus, because the additional economic impacts associated with Regulatory Alternative V, in comparison to Regulatory Alternative IV, are grossly disproportionate to the corresponding emission reductions, the Administrator did not select Regulatory Alternative V (90 percent control) as BAT and further evaluated Regulatory Alternative IV.

While Regulatory Alternative IV would not have the same magnitude of economic impacts associated with Regulatory Alternative V, it would still require replacement of some equipment and there could be some retrofit problems associated with this replacement. The Administrator therefore compared the impacts of Regulatory Alternative IV with those of Regulatory Alternative III before selecting BAT.

The only difference between Regulatory Alternatives IV and III is that Regulatory Alternative IV requires replacement of certain mechanical seal systems on pumps and compressors. Some existing pumps can not be retrofitted with dual mechanical seals to meet Regulatory Alternative IV because they do not have pump castings which would adequately house the seal systems. These pumps would have to be replaced. Some of the others which would not have to be replaced would require retrofitting of equipment, such as drive shaft bearings, so that the equipment would operate properly. Regulatory Alternative IV would reduce emissions by 6400 Mg/year. The capital and annualized costs which result from this emission reduction would be $25.3 million and $5.5 million, respectively. Regulatory Alternative III, on the other hand, would reduce emissions by 6100 Mg/year. The capital and annualized costs which would result from this emission reduction would be $9.7 million and $2.1 million per year, respectively.

Because the additional costs associated with nationwide retrofitting and replacing pump and compressor seal systems to meet Regulatory Alternative IV would be exorbitant in light of the resulting emission reductions and the fact that some otherwise properly functioning pumps would have to be replaced, the Administrator did not select Regulatory Alternative IV as BAT and evaluated Regulatory Alternative III.

After examining the costs associated with Regulatory Alternative III the Administrator concluded that its economic impact was reasonable. However, because Regulatory Alternative III could require some replacement of existing equipment, the Administrator compared the impacts of Regulatory Alternative III with those of

Regulatory Alternative II before selecting BAT. Regulatory Alternative III primarily requires monitoring for leaks rather than replacement of existing equipment. However, it does include some requirements for retrofitting equipment, such as placing rupture disks on the process side of relief valves. In some cases, this could result in derating of the relief valve to such an extent that it would need to be replaced by another relief valve. The costs of this replacement were considered in examining Regulatory Alternative III, and are considerably smaller than those associated with replacement of valves and pumps.

Regulatory Alternative III would reduce emissions by 6100 Mg/year and the associated capital and annualized costs would be $9.7 million and $2.1 million, respectively. Regulatory Alternative II would reduce emissions by 4700 Mg/year, and the associated capital cost would be $2.9 million. Regulatory Alternative II would result in an annualized cost credit. After considering the substantially greater emission reduction that would result from implementing Regulatory Alternative III rather than Regulatory Alternative II, the fact that the capital and annualized costs compared with emission reductions in these alternatives which were judged not to be exorbitant, and the lack of significant adverse economic impacts or technological problems associated with retrofit that would result from implementing Regulatory Alternative III, the Administrator selected Regulatory Alternative III as BAT. Thus, Regulatory Alternative III was selected as BAT because it represents the most advanced level of control considering economic, energy, and environmental impacts, and the technological problems associated with retrofit.

After Regulatory Alternative III was selected as BAT for existing sources, the estimated risks remaining after application of BAT were examined to determine whether they were unreasonable in view of the health benefits and costs that would result if a more stringent regulatory alternative were applied. The number of estimated excess leukemia deaths remaining after application of BAT to existing sources is estimated to range from 0.05 to 0.32 per year. After application of BAT to existing sources, the remaining estimated maximum lifetime risk of acquiring leukemia is estimated to range from 4.6×10^{-5} to 32×10^{-5} for the most exposed group.

The Administrator considered one control level beyond BAT for existing sources: 77 percent control, Regulatory Alternative IV. Requiring 77 percent control instead of 73 percent control would reduce the projected incidence of excess leukemia deaths from a range of 0.05 to 0.32 per year to a range of 0.04 to 0.27 per year. As discussed in the Rationale for Regulating Benzene Fugitive Emission Sources section of this preamble, a 20-year operational life is a reasonable estimate for petroleum refining and chemical manufacturing units. On this basis, the number of deaths estimated to occur over the life of the existing units would be reduced from a range of 1.0 to 6.4 (73 percent control) to a range of 0.8 to 5.4 (77 percent control). It would reduce the estimated maximum lifetime risk at the point of maximum exposure caused by fugitive emissions from a range of 4.6×10^{-5} to 32×10^{-5} to a range of 3.9×10^{-5} to 27×10^{-5}. On the other hand, requiring 77 percent control rather than 73 percent control would increase the capital costs from $9.7 to $25.3 million, the total annualized cost from $2.1 to $5.5 million, and the percentage increase in average benzene derivation prices from 0.13 to 0.37.

In view of the relatively small health benefits that would result with the additional costs of requiring 77 percent rather than 73 percent control for benzene fugitive emissions, the Administrator concluded that the risks remaining after application of BAT to existing sources are not unreasonable. Therefore, the Administrator decided not to require more stringent control than BAT for control of fugitive emissions.

Selection of the Basis for the Standard—New Sources

Selection of one of the regulatory alternatives to serve as the basis for the proposed standard for new sources involved the same type of analysis employed for existing sources. As with existing sources, the environmental, energy, and economic impacts of each alternative were considered and based on these considerations, one alternative was selected as BAT. After BAT was identified, the estimated risks remaining after application of BAT were examined to determine whether they were unreasonable in view of the health benefits and costs that would result if a more stringent option were applied.

To determine the incremental environmental, energy, and economic impacts of the regulatory alternative for new sources, an uncontrolled 1985 baseline was used. The baseline was established by estimating the number of new and reconstructed Model Units A, B, and C which would be affected by the proposed standard by 1985. Emission factors were then applied to the Model Units to establish the baseline.

Since each of the Model Units represents average component counts for several different chemical processes, the growth rate (including both new and reconstructed facilities) for each Model Unit was different. The projected growth rates were: Model Unit A, 6 percent per year; Model Unit B, 2 percent per year; Model Unit C, 10 percent per year.

Thus, the total numbers of new units for 1985 were determined to be: Model Unit A, 47 units; Model Unit B, 7 units; Model Unit C, 14 units. Based on these numbers, the 1985 baseline emissions (Regulatory Alternative I) were determined to be 2,500 Mg per year.

Regulatory Alternative II would reduce benzene fugitive emissions from new facilities through 1985 from 2,500 Mg per year to 1,100 Mg per year, yielding a 56 percent reduction in emissions. Regulatory Alternative III would reduce these emissions to 700 Mg per year, yielding a 72 percent reduction. Regulatory Alternative IV would reduce fugitive emissions to 500 Mg per year, yielding a 80 percent reduction. Regulatory Alternative V would reduce emissions to 200 Mg per year, yielding a 92 percent reduction from the baseline.

As in the case for existing sources, the implementation of the regulatory alternatives for new sources would not result in any significant impact on water quality, solid waste, or noise. As previously discussed, there would be slight positive benefits to water quality and energy as a result of increasingly stringent leak control associated with more stringent regulatory alternatives.

The main difference in the considerations of applying the alternatives to new sources was in the capital and annualized costs of implementing the alternatives. The costs of implementing the alternatives are lower for new sources than for existing sources because no retrofitting expenses are involved. Fifth-year industry costs, including recovery credits, can be summarized for new sources as follows: (1) Alternative II would require a total capital investment of $820 thousand and would result in an annualized savings of $70 thousand; (2) Alternative III would require a capital investment of $2.2 million and an annualized cost of $420 thousand; (3) Alternative IV would require a capital investment of $6.5 million and an annualized cost of $1.3 million; (4) Alternative V would require a capital investment of $48.4 million and an annualized cost of $11.4 million.

The annualized costs required to implement Alternatives II, III, IV, and V for new sources could cause the average

price of benzene derivatives produced in new plants to rise by about 0.03, 0.10, 0.30, and 3.3 percent, respectively. With regard to the burden imposed by the increased capital costs, the average percentage increase in required capital investment for new plants would be about 0.07 percent for Alternative II, 0.20 percent for Alternative III, 0.50 percent for Alternative IV, and 4.5 percent for Alternative V.

In selecting best available technology (BAT) for new sources, the Administrator reviewed technology to determine the most advanced level of controls adequately demonstrated, considering economic, energy, and environmental impacts. First, Regulatory Alternative VI was examined. This regulatory alternative would eliminate benzene fugitive emissions from the industries. However, it would result in no new construction for a number of industries. Thus, the Administrator did not select Regulatory Alternative VI as the basis for BAT because the lack of growth in these industries would result in adverse economic impacts.

Second, Regulator Alternative V was examined. This alternative would require the most advanced level of controls. This regulatory alternative would result in a 2,300 megagram per year reduction in benzene emissions from the baseline for new plants. Regulatory Alternative V could result in price increases of greater than 4 percent for several specialty products made from benzene, although the average percent price increase for these products would be 3.3 percent. In addition, this alternative would result in industry-wide cumulative percent price increases (i.e., percent price increases that are passed through due to price increases for benzene production and price increases in benzene-derivative production) from 1.5 percent to about 5 percent. Capital cost for this alternative would be $48.4 million, and the annualized cost would be $11.4 million. Because the implementation of Regulatory Alternative V could result in adverse economic impacts, the Administrator examined Regulatory Alternative IV before Selecting BAT.

Regulatory Alternative IV would require the next most advanced level of controls to the levels for Regulatory Alternative V. This alternative would reslt in a 2,000 megagram per year reduction in benzene. Regulatory Alternative IV would result in cumulative percent price increases of less than 1 percent for all affected chemicals. Capital costs would be $6.5 million, and annualized costs would be $1.3 million. This regulatory alternative would not result in adverse economic impacts.

The Administrator considered the level of controls for Regulatory Alternative V and Regulatory Alternative IV and their economic impacts before selecting BAT. The level of controls for Regulatory Alternative V would result in an additional 15 percent emission reduction over the level for Regulatory Alternative IV. In contrast to these impacts, Regulatory Alternative V would result in much greater economic impacts than Regulatory Alternative IV. For example, the capital and annualized costs of Regulatory Alternative V are seven times the cost for Regulatory Alternative IV. In addition, the percent price increases associated with Regulatory Alternative V could result in adverse impacts, whereas those associated with Regulatory Alternative IV would not result in adverse impacts. Thus, becaue the additional emission reduction associated with Regulatory Alternative V in comparison to Regulatory Alternative IV and the economic impacts associated with Regulatory Alternative V and and Regulatory Alternative IV are grossly disproportionate, the Administrator selected Regulatory Alternative IV (77 percent control) as BAT.

The proposed *Policy and Procedures for Identifying, Assessing and Regulating Airborne Substances Posing a Risk of Cancer* includes certain requirements for the siting of new sources (44 FR 58651). These are not implemented in the proposed standard because the details of the procedures have not been formulated. New source siting requirements for fugitive emission sources of benzene may be proposed in the future, but would only apply to new sources constructed, modified, or reconstructed after the proposal data of such siting requirements.

For new sources constructed, modified, or reconstructed in the interim, the Administrator is making a judgment concerning whether the estimated risks remaining after the application of BAT selected for new sources are unreasonable in view of the health benefits and costs, economic impacts, and other impacts that would result if a more stringent alternative were selected. In making this judgment, the approach used was that of estimating the residual risks based on the assumption that population distributions would be similar to those around existing plants and estimates of benzene emissions from new plants. The Administrator decided to use this approach because it seemed the most reasonable approach in the absence of new source siting requirements.

No information is available on the number of people which will be exposed to the emissions from new refining and chemical manufacturing units. They could be located at existing plant sites or entirely new sites. There is no available information to indicate that population distributions around new units will be greater or less than they are for existing units. Therefore, for purposes of estimating deaths due to emissions from new units, it was assumed that the population distributions would be the same as they are for existing units. Therefore, residual deaths were calculated for new sources by using the growth projections for new unit capacity and assuming the population distrubutions were the same new for units as for existing units. Even if new units were added at existing plant sites, this would be accurate assumption since the people living in the vicinity of these plants would be exposed to additional emissions and a linear dose-response model was used to calculate deaths.

In calculating the residual maximum lifetime risk after application of BAT to new sources, it is reasonable to assume that exposures around new facilities would be no greater than they are around existing plant sites. They could be greater if new units were added to the existing plant site associated with the maximum lifetime risk for existing sources. Since there is no information indicating that this will occur, it was assumed that the maximum lifetime risk associated with new sources would be no greater than for existing sources.

After Alternative IV was identified as BAT for new sources, the estimated risks remaining after application of BAT were estimated using the assumption discussed above and used to determine whether they were unreasonable in view of the health benefits and costs that would result if a more stringent option were applied. The number of estimated excess leukemia deaths remaining after application of BAT to new sources is estimated to range from 0.01 to 0.08 per year. The remaining estimated maximum lifetime risk of acquiring leukemia is estimated to range from 3.9×10^{-5} to 27×10^{-5} for the most exposed group living near a source of benzene fugitive emissions.*

The Administrator considered one control level beyond BAT for new sources: 90 percent control, Alternative

* This range is the same for new and existing sources because it was assumed that new sources could be built that would have the same maximum potential emissions as the largest existing source.

V. Requiring 90 percent control instead of 77 percent control would reduce the projected incidence of excess leukemia deaths from a range of 0.01 to 0.08 per year to a range of 0.005 to 0.03 per year. It would reduce the estimated maximum lifetime risk at the point of maximum exposure caused by fugitive emissions from a range of 3.9×10^{-5} to 27×10^{-5} to a range of 1.7×10^{-5} to 12×10^{-5}. On the other hand, requiring 90 percent control rather than 77 percent control would increase the capital costs from $6.5 to $48.4 million, the total annualized cost from $1.3 to $11.4 million, and the percentage increase in average benzene derivative prices from 0.30 to 3.3.

In view of the relatively small health benefits that would be gained with the additional costs of requiring 90 percent rather than 77 percent control for benzene fugitive emissions, the Administrator concluded that the risks remaining after application of BAT to new sources are not unreasonable. Therefore, the Administrator decided not to require more stringent control than BAT for fugitive emissions.

New Source Siting

New source siting requirements were included in the proposed policy and procedures for identifying, assessing, and regulating airborne substances posing a risk of cancer (44 FR 58642). The proposed standard does not include provisions to implement these new source siting requirements. However, they may be proposed at a later date. Such a proposal for new source siting provisions would apply to designated sources that become new sources after that proposal date.

Selection of Format for the Proposed Standard

Section 112 of the Clean Air Act requires that an emission standard, or mass emission limitation, be established for control of a hazardous air pollutant unless, in the judgment of the Administrator, it is not feasible to prescribe or enforce such a standard. An emission standard allows for some flexibility in complying with the standard, since any control technique that achieves the standard may be applied.

Section 112(e)(2) defines the following conditions under which it is not feasible to prescribe or enforce an emission standard: (1) if the pollutants can not be emitted through a conveyance designed and constructed to emit or capture the pollutant; or (2) if the application of measurement methodology is not practicable due to technological or economic limitations. Section 112(e)(1) allows that if an emission standard is not feasible to prescribe or enforce, then the Administrator may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof.

An emission standard may not be feasible to prescribe or enforce for benzene fugitive emission sources. Another approach for prescribing a standard would be to specify an allowable leak percentage in terms of a maximum number or percentage of fugitive emission sources that would be allowed to leak. This approach would not establish an emission level on a mass emission rate basis but would have some of the same advantages of an emission standard in that it would allow for flexibility in complying with the standard.

An allowable leak percentage might be defined by utilizing proposed Reference Method 21. However, available test data indicate variability in leak percentages among process units. This variability has precluded the setting of an industry-wide allowable leak percentage that would represent an achievable limit. The allowable leak percentage approach is discussed in Alternative Standard for Pipeline Valves in the next section of this preamble. Using that approach, a plant owner or operator would collect data for at least one year and then commit to an allowable leak percentage on a site-specific basis. The variability in leak percentages would be a factor that an owner of operator would consider before committing to an allowable leak percentage.

The equipment standard format, in general, provides well-documented emissions reductions. Published information is available on applications of various types of equipment; and in some cases, emission test data may be available from existing installations. Compliance would require an initial check to ensure that the equipment had been installed properly and periodic checks to assure that the equipment was continuing to operate properly. However, an inherent disadvantage associated with this type of format is that less site-specific flexibility is provided and innovation may be stymied.

Another format would be work practices. An example of this format would be a program for detecting and repairing leaks. Inspection methods, inspection time intervals, and time allowed for repair would be defined in detailing the work practices. Compliance with a work practice standard would be determined by judging success in implementing the work practices. Some recordkeeping and reporting would be needed to serve as the basis for judging this success.

The proposed standard incorporates these potential regulatory formats. Different formats could be required for different fugitive emission sources, because characteristics of available emission control techniques differ among the fugitive emission sources. In the next section the rationale for selecting a particular format is explained for each type of fugitive emission source. For each fugitive emission source, the feasibility of precribing or enforcing an emission standard is carefully considered. If an emission standard is not feasible, then one of the other formats is selected.

Selection of Emission, Equipment, Work Practice, Design and Operational Standards

As discussed in Selection of Format for the Proposed Standard, Section 112(e) of the Clean Air Act requires that an emission standard be promulgated unless it is not feasible to prescribe or enforce such a standard. Thus, control techniques in Regulatory Alternatives III and IV were evaluated for existing and new sources, respectively to determine if an emission standard could be promulgated.

Safety/Relief Valves

The control technique of applying rupture disks was evaluated as a potential equipment specification for existing and new gas service safety/relief valves under Regulatory Alternatives III and IV, respectively. When the integrity of a rupture disk is maintained, fugitive emissions through the relief valve are eliminated. Properly installed rupture disks will generally maintain their integrity under normal operating conditions unless an overpressure relief situation occurs. After an overpressure relief, replacement of the rupture disk, once again, eliminates fugitive emissions through the safety/relief valve.

Since there is a control technique available that eliminates fugitive emissions from safety/relief valves, it is feasible to prescribe an emission limit of "no detectable emissions," that is, an organic chemical concentration less than 200 ppm above a backgraound concentration as measured by proposed Reference Method 21. The application of a quantitative measurement methodology, such as bagging, to prescribe a no detectable emissions limit would not be feasible due to technological limitations discussed in Selection of Test Method. However, proposed Reference Method 21 can be used to detect leaks of fugitive

emissions from safety/relief valves. A safety/relief valve equipped with a properly functioning rupture disk would not leak. The detection of an organic chemical concentration at or above 200 ppm by proposed Reference Method 21 would indicate that the relief valve was leaking. Therefore, it is feasible to prescribe a no detectable emissions limit as the proposed standard for existing and new safety/relief valves in gas service.

The no detectable emissions limit would not apply to discharges through the safety/relief valve during overpressure conditions because the function of the safety/relief valve is to discharge process fluid, thereby reducing dangerous high pressures within the process. The standard would specify, however, that the safety/relief valve be returned to a state of no detectable emissions within five days after such a discharge. It would further require an annual test to verify the no detectable emissions status of the safety/relief valve.

Product Accumulator Vessels

The control technique of connecting existing and new product accumulator vessels to a control device with a closed vent system was evaluated under Regulatory Alternatives III and IV, respectively. A properly designed and installed closed vent system would completely eliminate fugitive emissions from the product accumulator vessel. Since the flow rates of the gaseous emissions from product accumulator vessels are of a much smaller magnitude than those from safety/relief valves, the emissions can be safely disposed of in an enclosed combustion device or can be collected by a vapor recovery system. Specifications for the control device used to dispose of or capture emissions from the closed vent system are included in the proposed standard and are discussed later in this section.

As with safety/relief valves, a control technique is available that eliminates fugitive emissions from the product accumulator vessels. Also, proposed Reference Method 21 can be used to verify that a closed vent system has been designed and installed properly and has eliminated fugitive emissions from a product accumulator vessel. Therefore, since it is feasible to prescribe an emission limit, the proposed standard for product accumulator vessels is no detectable emissions. As with safety/relief valves, the proposed standard requires an initial performance test, using proposed Reference Method 21, to verify that a product accumulator vessel meets the no detectable emissions limit, and annual rechecks to ensure continued operation at no detectable emissions.

Other Fugitive Emission Sources With No Detectable Emissions

As discussed in the following sections, fugitive emission sources other than safety/relief valves and product accumulator vessels can operate with no detectable emissions when leakless equipment is used. For example, canned pumps and diaphragm valves can operate with no detectable emissions. Even though leakless equipment can not be used in all cases, it can comply with a no detectable emissions requirement when it is used. Leakless equipment is at least as effective as work practices and other equipment in reducing benzene emissions, because emissions of benzene from leakless equipment are eliminated. Therefore, the proposed standard considers the application of leakless equipment to be equivalent to the application of work practices and other equipment for fugitive emission sources other than safety/relief valves and product accumulator vessels. As with safety/relief valves, the proposed standard requires an initial performace test, using proposed Reference Method 21, to verify that a piece of leakless equipment meets the no detectable emissions limit, annual rechecks to ensure continued operation at no detectable emissions, and rechecks at the request of the Administrator.

New Pumps

In the analysis of the impacts of Regulatory Alternative IV, dual machanical seal systems were considered as the control technique for new pumps. The evaluation of this control technique first considered the practicability of setting an emission limit. An emission limit standard for pumps is not practicable, however. First, even through new pumps can, in some instances, be equipped to release fugitive emissions into a conveyance mechanism, measurement of these emissions is not practicable due to technological limitations with measuring very low flow, intermittent emission sources. Second, determining emission levels at the pump would require that each pump be bagged as described in the Selection of Test Method section of this preamble. Measurement of an emission level using the bagging method is time consuming, expensive, and impractical. A no detectable emissions limit is not possible to prescribe because data currently available show that pumps equipped with dual mechanical seal systems may not meet such a standard. Thus, because the application of available measurement methods would not be practicable due to technological or economic limitations, an emission standard has not been proposed for new pumps.

Equipment specifications evaluated for new pumps were dual mechanical seal systems (double and tandem), closed vents for the pump seal areas, and sealless pumps. Double mechanical seal systems have two seals in a back-to-back arrangement, with a barrier fluid between the two seals. The barrier fluid is typically maintained at a pressure greater than the pump stuffing box pressure so that any leakage between the seals would be from the barrier fluid to the working fluid; therefore, no benzene would be emitted.

Tandem mechanical seal systems also utilize a barrier fluid; however, the barrier fluid pressure is maintained at a pressure lower than the pump stuffing box pressure. In this arrangement, there is leakage of the working fluid into the barrier fluid. Leakage into the barrier fluid is controlled by either (1) connecting the barrier fluid degassing system to a control device (enclosed combustion or vapor recovery) with a closed vent system or (2) by continuously replacing the fluid with fresh barrier fluid and properly disposing of the contaminated barrier fluid. In either case, the benzene concentration in the barrier fluid must be maintained below 10 percent by weight in order to minimize potential benzene leakage from the outer seal.

Dual mechanical seals utilizing a barrier fluid are the most universally applicable of the options evaluated, and these systems provide a high control efficiency (dependent on the degassing vent control device efficiency). Thus, the Administrator selected the dual mechanical seal and barrier fluid system as the required equipment for new pumps.

Section 112(e) of the Clean Air Act requires that when equipment standards are established, requirements must also be established to ensure the proper operation and maintenance of the equipment. A pressure or level indicator on the barrier fluid system would reveal any catastrophic failure of the inner or outer seal, or of the barrier fluid system. This indicator would be monitored in the control room or equipped with an alarm to signal a failure of the system. These requirements are proposed, therefore, to ensure the proper operation and maintenance of the dual mechanical seal system.

Sealless pumps, such as diaphragm or canned pumps, do not have a potential leak area and, therefore, should achieve approximately 100 percent control. However, sealless pumps may not be

suitable for use in some process applications due to throughput, pressure or fluid composition constraints. For these reasons, sealless pumps were not selected under Regulatory Alternative IV. Leakless equipment, such as sealless pumps, are at least equivalent to dual mechanical seal systems, because benzene emissions from leakless equipment are eliminated. Thus, any equipment that complies with a no detectable emissions limit is equivalent to the dual mechanical seal system. As with other leakless equipment, the proposed standard requires an initial performance test, using proposed Reference Method 21, to verify that the piece of leakless equipment meets the no detectable emissions limit, and annual rechecks to ensure continued operation at no detectable emissions.

The seal area of a pump could be completely enclosed, and this enclosed area could be connected to a control device (enclosed combustion or vapor recovery) with a closed vent system. The control efficiency of this arrangement is dependent on the control efficiency of the vapor recovery system or enclosed combustion device. The closed vent system could require a flow-inducing device to transport emissions from the seal area to the control device. Because of safety or operating constraints, enclosure of the pump seal area may not be feasible in all cases. However, there may be pump applications that require pumps that can not be equipped with dual mechanical seals and can not be replaced with a sealless pump, and the enclosed seal area would be the best option for such pumps. Therefore, the Administrator is proposing to allow new pumps to be equipped with enclosed seal areas that are connected to a control device with a closed vent system.

New Compressors

As in the case for new pumps, emission limits for new compressors have not been proposed because the application of available measurement methods would not be practicable due to technological or economic limitations. Like pumps, compressors are not generally designed to release fugitive emissions into a conveyance, and bagging of compressors for emission measurement would be expensive and impractical.

Equipment specifications evaluated for new compressors were (1) sealless compressors; (2) mechanical contact seal systems with barrier fluid systems and, if degassing is necessary, barrier fluid degassing vents connected to a control device; and (3) enclosed compressor seal areas vented to a control device. Mechanical contact seal systems were selected as the basis for Regulatory Alternative IV. The barrier fluid system used in this equipment would be similar to the system described for pumps with dual mechanical seals, although the compressor seal may be mechanical contact, oil film, or another type of seal. Leakage through the seal results in the presence of benzene in the barrier fluid, and this benzene could be emitted from the barrier fluid system. However, this benzene would be collected and directed to a control device (enclosed combustion or vapor recovery system) by a closed vent system that is connected to the barrier fluid system. This approach provides a high control efficiency and is the most applicable effective control technique for new compressors. Thus, the Administrator selected a seal system which includes a barrier fluid system as the required equipment for new compressors.

Section 112(e) of the Clean Air Act requires that when equipment standards are established, requirements must also be established to ensure the proper operation and maintenance of the equipment. A pressure or level indicator on the barrier fluid system would reveal any catastrophic failure of the inner or outer seal, or of the barrier fluid system. This indicator would be monitored in the control room or equipped with an alarm to signal a failure of the system. These requirements are proposed, therefore, to ensure the proper operation and maintenance of the mechanical contact seal system.

Although sealless compressors would achieve approximately 100 percent control, sealless compressors are not readily available in capacities large enough for most process applications and, therefore, have limited use. Consequently, sealless compressors were not considered under Regulatory Alternative IV and were not selected as equipment for the proposed standard. Leakless equipment, such as sealless compressors, are at least equivalent to mechanical contact seal systems, because benzene emissions from leakless equipment are eliminated. Thus, any equipment that complies with a no detectable emissions limit is equivalent to the mechanical contact seal system. As with other leakless equipment, the proposed standard requires an initial performance test, using proposed Reference Method 21, to verify that the piece of leakless equipment meets the no detectable emissions limit, and annual rechecks to ensure continued operation at no detectable emissions.

There are some cases in which seals with barrier fluid systems can not be utilized. For example, for some high pressure applications, reciprocating compressors may be required. Mechanical seals with a barrier fluid system can not be used under all process conditions due to pressure limitations. For those cases in which mechanical contact seals are not technically feasible, enclosure of the seal area would be the best option for new compressors. The enclosed area would be connected to a control device (enclosed combustion or vapor recovery) with a closed vent system. Therefore, the Administrator proposes to allow seal areas to be enclosed and connected to a control device with a closed vent system for new compressors.

Open-Ended Valves

Benzene from open-ended valves occurs due to leakage through the valve seat of a valve which seals the open end from the process fluid. Generally, open-ended valves are not designed to release fugitive emissions to a conveyance, and bagging of these sources for emission measurement would not be practical. A no detectable emissions limit is not feasible to prescribe because benzene could leak through the valve seat and become trapped in the line between the valve and closure. Consequently, benzene could be emitted. Thus, the approach of requiring equipment was examined.

Equipment considered for open-ended valves included improved valve seat technology and closure of the open-end. Improved valve seat technology was not selected because the effectiveness of such technology could be nullified by operating variables such as incomplete closure of the valve by operating personnel. Closure of the open end could be achieved by installing a cap, plug, blind, or a second valve on the open end. The control efficiency associated with these techniques is approximately 100 percent, except when the line is used for a draining or venting operation. Thus, the Administrator is proposing standards that require open-ended valves to be equipped with a cap, plug, blind, or a second valve.

To ensure the proper operation of the equipment, open-ended lines would also be covered by an operational standard. If a second valve is used, the proposed standard would require the upstream valve to be closed first. After the upstream valve is completely closed, the downstream valve must be closed. This operational requirement is necessary in order to prevent trapping process fluid between the two valves, which could

result in a situation equivalent to the uncontrolled open-ended valve.

Sampling Connections

When process samples are taken for analysis, it is necessary to purge some process fluid through the sample connection to obtain a representative stream sample. This sample purge would be vented to atmosphere if the fluid was gaseous, and liquid sample purges could be drained onto the ground or into open collection systems where evaporative emissions would result. Generally, sampling connections are not designed to release fugitive emissions to a conveyance, and bagging of these sources for emission measurement would not be practical. A no detectable emissions limit is not feasible to prescribe because no available data indicate that application of any control technique would be able to comply with such a standard at all times.

Closed-loop sampling was considered as the equipment specification for sampling connections. Closed-loop sampling systems eliminate emissions due to purging by either returning the purge materiaal directly to the process or by collecting the purge in a collection system which is not open to atmosphere for recycle or disposal. Thus, the Administrator selected closed-loop sampling systems as the required equipment for sampling connections.

Process Drains

Control by minimizing the potential for benzene leakage into the process drain system was considered for process drains. However, controls are specified for all potential major sources of benzene leakage into process drain systems. Thus, the Administrator did not consider it necessary to specify additional controls for process drains in the proposed standard.

Pipeline Valves, Existing Pumps, and Existing Compressors

Like some of the previously discussed fugitive emission sources, pipeline valves, existing pumps, and existing compressors are generally not designed to release fugitive emissions to a conveyance. Because of the large number and diverse location of valves, existing pumps, and existing compressors, bagging of these sources for emission measurement would not be economical or practical. A no detectable emissions limit can not be prescribed, because, with the control technique specified in Regulatory Alternatives III and IV, pipeline valves, existing pumps, and existing compressors are expected to leak occasionally. However, pipeline valves, existing pumps, and existing compressors that are designed to achieve a no detectable emission limit would be allowed and exempted from other requirements as discussed in the Other Fugitive Emission Sources with No Detectable Emissions section of this preamble.

Work practices consisting of periodic leak detection and repair programs were considered for valves, existing pumps, and existing compressors. Several factors influence the level of emission reduction that can be achieved by a leak detection and repair program. The three main factors are the monitoring interval, leak definition, and repair interval. Training and diligence of personnel conducting the program, repair methods attempted, and other site-specific factors may also influence the level of emission reduction achievable; however, these factors are less quantifiable than the three main factors.

The monitoring interval is the frequency at which individual component monitoring is conducted. The length of time between inspections is best determined by the rate at which new leaks occur and repaired leaks recur. More frequent inspections could then be required for sources which tend to leak more often. Available data that quantify the frequency of occurrence and recurrence of leaks are limited. However, more frequent monitoring would result in greater emission reduction because more frequent monitoring would require earlier leak detection and, therefore, would result in repair of leaks sooner.

Monthly monitoring was considered in Regulatory Alternatives III and IV. Tests indicate that leaks will be found with monthly inspections. Since some time may be required to schedule repair after a leak is detected, monitoring intervals shorter than one month could result in a situation where a detected leak could not be repaired before the next monitoring was required. One month was selected as the required monitoring interval because it would provide the greatest emission reduction potential without imposing difficulties in implementing the leak detection and repair program.

Monthly monitoring of valves to detect leaks is reasonable. However, some valves may leak less frequently than others. One indicator that might predict which valves leak is valve leak history. That is, once a valve leaks, then it may be more likely to leak again than a valve that has not leaked. The Administrator decided to implement the monthly monitoring requirement by focusing on the valves that tend to leak more often. One approach of doing this is to allow an alternative monitoring period for valves found to leak less frequently than others. The Administrator is proposing that leak detection and repair work practices include monthly monitoring for valves unless they are found not to leak for two successive months. If a valve is found not to leak for two successive months, the owner or operator may elect to monitor during the first month of the next quarter and quarterly thereafter until a leak is detected. Whenever a leak is detected, the valve would be monitored once a month until the valve did not leak for two successive months.

The proposed standard for valves is based on the assumption that recurrence is an important factor in predicting valve leaks. This assumption was used to develop a monitoring program that would result in a level of fugitive emission control comparable to that resulting from monthly monitoring. EPA does not intend to propose a monitoring plan that would be comparable to quarterly monitoring.

EPA is currently collecting data concerning the importance of valve leak recurrence. This data should be available for public review before the end of the public comment period. If the data show that recurrence is not a significant contributor to the total number of leaking valves, the proposed program will be reassessed and consideration will be given to returning to strict monthly monitoring.

The leak definition is the concentration observed during monitoring that defines leaking sources that require repair. As discussed in the Selection of Test Method section, the proposed standard would require the use of proposed Reference Method 21 to measure concentrations of organic chemicals at the leak interface. Two primary factors affect the selection of the leak definition. These factors are (1) the percent of total mass emissions which can potentially be controlled by the leak detection/repair program, and (2) the ability to repair the leaking components. The maximum potential emission reduction resulting from various leak definitions can be estimated for valves, pumps, and compressors in benzene service. Estimated emission reduction potentials (i.e., the maximum control efficiency that could be achieved if other contributing factors were 100 percent) are shown in Table 4–2 of the Background Information Document.

As the leak definition decreases, the maximum potential emission reduction increases due to the increasing number of sources that are found to be leaking and are repaired. The overall emission reduction of a leak detection and repair

program depends on several factors as noted above. Each of these factors limits the effectiveness of the program. If each of the factors considered in selecting the leak detection and repair program is 90 percent effective, then the overall effectiveness would be about 73 percent. Thus, the most restrictive definition that is reasonable for each factor should be selected. In order to provide the maximum control effectiveness of the leak detection and repair program, the lowest leak definition that is feasible in terms of monitoring and repair-ability should be selected.

Preliminary data from petroleum refineries show that attempting on-line repair at or above a leak definition of 10,000 ppm could result in a few cases where the attempted repair would increase the emission rate. However, these cases do not offset emission reductions achieved by repair. In these cases, more extensive repair effort than tightening or regreasing the packing would be required. These data also show that attempting repair in the 1,000 to 10,000 ppm (low level) range could result more often in individual emission rates with increases after simple repair. If such increases were to occur, the attempted repair of "low level" leaks could result in a lower overall emission reduction at 1,000 ppm than at the 10,000 ppm leak definition. Because the 10,000 ppm leak definition may provide a higher overall emission reduction of benzene fugitive emissions than the 1,000 ppm action level, 10,000 ppm was selected as the leak definition for leak detection monitoring.

The repair interval is the length of time allowed between the detection of a leaking source and repair of the source. As noted above, in order to make the overall program effective, the most restrictive selection for this factor should be chosen. Thus, in order to provide the maximum effectiveness of the leak detection and repair program, the repair interval should require exepeditious reduction of emissions but should allow the owner or operator sufficient time to maintain some degree of flexibility in overall maintenance scheduling.

The length of the repair interval would affect emission reductions achievable by the leak detection and repair program because leaking sources would be allowed to continue to leak for a given length of time. Repair intervals of 1, 5, 10, 30 and 45 days were evaluated. The effect on the maximum emission reduction potential is proportional to the number of days the source is allowed to leak between detection and repair.

A repair interval of one day would cause problems in coordinating activities of personnel involved in leak detection and leak repair and in some instances would not be technically feasible. A repair interval of one day would essentially require repair of each component as soon as the leak was discoverd.

Some valves, pumps, and compressors may not be repairable by simple field maintenance. They may require spare parts or removal from the process for repair. Repair intervals of 5 and 10 days could cause problems in obtaining acceptable repair, especially when removal from the process would be required. However, a 15-day interval provides the owner or operator with sufficient time for flexibility in repair scheduling, and provides time for better determination of methods for isolating pieces of leaking equipment for repair. In general, a 15-day repair interval allows more efficient handling of repair tasks while maintaining an effective reduction in fugitive emissions. Thus, the repair interval selected for proposal in the leak repair program is 15 days. A repair interval of 30 or 45 days was not selected because 15 days is the most restrictive yet feasible selection.

However, the first attempt at repair of a leaking source should be accomplished as soon as practicable after detection of the leak, but no later than five days after discovery. Most repairs can be done quickly, and five days should provide sufficient time to schedule maintenance and repair a leaking valve. Attempting to repair the leak within five days will help to identify the leaks that can not be repaired within the 15-day repair interval. Delay of repair would be allowed for leaks that could not be repaired without a process unit shutdown. These leaks would have to be repaired at the next scheduled unit shutdown.

Some existing pumps and compressors have been built with dual mechanical seal systems like those that would be required for new pumps and compressors. Because these existing pumps and compressors would achieve an emission reduction greater than that associated with the proposed work practices, they would be allowed and, therefore, would be exempted from the required work practices if a plant owner or operator chooses to reduce emissions through the use of the seal system. However, they would be required to comply with the dual mechanical seal system requirements as specified for new pumps and compressors.

Alternative Standard for Pipeline Valves

In an effort to provide more flexibility, two alternative standards are being proposed for pipeline valves in benzene service. Plant owners or operators could elect to comply with one of the alternative standards in order to tailor fugitive emission control programs to their own operations. Before the alternative standard could be considered, however, a plant owner or operator would implement a monthly monitoring program for at least one year. A plant owner or operator then could elect to comply with one of the alternative standards which would be based on information gathered during the 1-year implementation of monthly monitoring.

The first alternative standard would provide an allowable percentage of leaking valves. This type of standard would provide the flexibility of a performance standard by setting a limit which could be achieved by the most efficient and practical methods for a particular operation. As previously pointed out in Selection of Format for the Proposed Standard section of this preamble, an industry-wide allowable leak percentage was not possible for valves because of the variability in valve leak percentages among similar processes within the industry. However, the alternative standard would allow each process unit to comply with an allowable percentage of leaking valves which is determined by valve performance based on monthly monitoring in the leak detection and repair program.

The allowable percentage of leaking valves would be determined by averaging the percentage of valves found leaking in each month of the last six months of monitoring, excluding those which could not be repaired without a process unit shutdown. To this average would be added the additional percentage of leaks which would occur if valves found leaking were monitored monthly and those not found leaking for two successive months were monitored quarterly. The resulting sum would be the performance standard for the percentage of leaking valves that would be allowed at any time. If an owner or operator elected to comply with an allowable percentage of leaking valves, he would be required to meet this alternative standard at any time, even though his allowable percentage would be based on the average performance of a leak detection and repair program. Choosing this alternative standard would allow the possibility of using different monitoring and maintenance

programs and substitution of engineering controls at the discretion of the owner or operator. In addition, the alternative standard would eliminate much of the recordkeeping and reporting associated with the proposed standard for pipeline valves.

This alternative would require a minimum of one performance test per year. Additional performance tests could be requested by EPA. If the results of a performance test showed a precentage of leaking valves higher than the allowable limit, the process unit would be in violation. Reporting would consist of submitting performance test results to the Administrator; quarterly reporting would be eliminated for valves.

The second alternative standard would provide for the use of different work practices which would achieve the same level of control as the proposed standard for valves. After performing monthly monitoring for at least a year, the data collected would be used to devise work practices which would achieve the same control as the work practices specified in the proposed standard. Using this approach, an owner or operator could optimize labor and capital costs to achieve the required level of control by varying monitoring intervals or installing valves with lower probabilities of leaking. Quarterly reporting would be required under this alternative as it is under the proposed standard.

An owner or operator would request approval from the Administrator to use either alternative standard for pipeline valves. A request for approval would be accompanied by a description of the standard being selected for compliance and data and calculations supporting the basis for the alternative standard. The Administrator would approve or disapprove the alternative standard within 90 days of the request for approval. A denial from the Administrator would be accompanied by his reasoning for denial. An owner or operator would be required to comply with the proposed work practice standard for pipeline valves until the alternative is approved.

The approach of providing an alternative standard would be reassessed before promulgation of the proposed standard and, if promulgated, would be reviewed at the fifth-year review. At that time, changing, eliminating, or continuing the alternative standard would be considered.

Control Devices

Control devices would be used to dispose of benzene captured in closed vent systems from barrier fluid degassing systems, enclosed pump and compressor seal areas, and product accumulator vessels. In all cases, these control devices would receive streams with low and intermittent flow rates. These control devices may be designed to dispose of organic streams from other sources in the plant; therefore, the benzene streams may contribute a very small portion of the total loading on the control device. For these reasons, and because of technological limitations with measuring very low-flow streams, an emission standard was not proposed for these control devices.

Design requirements were evaluated in order to ensure that appropriate emission reductions would be achieved from control devices used in conjunction with closed vent systems. Enclosed combustion devices and vapor recovery systems were considered in evaluating control device design requirements. Enclosed combustion was specified because open flares may only be 60 percent efficient for benzene destruction in these low flow, intermittent streams. The design requirements specified for enclosed combustion are the attainment of a minimum 760° C for 0.5 seconds. Under these conditions, greater than 95 percent benzene destruction is achieved. Vapor recovery systems may also be used to control benzene from closed vent systems. A controlled efficiency of 95 percent was chosen as the design requirement because it is a reasonable control efficiency achievable for vapor recovery systems such as carbon adsorption or condensation units. These control devices would receive intermittent flows from the fugitive emission sources and, therefore, would require operation only during emissions from these sources. The Administrator is, therefore, proposing that the standard require enclosed combustion devices and vapor recovery systems used as control devices for closed vent systems to be designed for 95 percent benzene emission reduction and operated when emissions from sources covered by the proposed standard are vented to the control device.

Exclusions

Safety/relief valves in liquid service and flanges were excluded from routine monitoring and equipment requirements. However, if leaks from these sources are observed, repair would be required. These sources were excluded from routine monitoring and equipment requirements based on data from petroleum refineries, which is also applicable to the chemical industry. Flanges in refineries have very low emission rates. They contribute 2.2 percent of all emissions, but include 61 percent of the total number of sources. Safety/relief valves in liquid service also have very low emission rates in refineries. They contribute only 0.2 percent in all emissions. Since these types of sources contribute a very small portion of overall emissions, including them in the routine monitoring and equipment requirements was not considered reasonable.

Control Technique and Equipment Failures

Control technique and equipment failures can cause increased emissions from fugitive emission sources. Most control techniques and equipment for fugitive emission sources do not eliminate the possibility of emissions that result from control technique and equipment failures. For example, failure of dual mechanical seal systems does occur and can result in emissions of benzene that would not have otherwise occurred. The requirements included in the proposed standard, however, include provisions for controlling fugitive emissions during these failures. Thus, as discussed below, additional requirements for reducing emissions during control technique and equipment failures were not necessary.

For pipeline valves, existing pumps, and existing compressors, the proposed standard requires periodic leak detection and repair. This practice focuses on locting leaking valves, existing pumps, and existing compressors and requiring their repair. Certain leaking valves, existing pumps, and existing compressors can not be repaired within 15 days without a process unit shutdown. The proposed standard allows delays for repair of these pieces of equipment beyond 15 days and provides for repair of the leaking equipment during a process unit shutdown.

For new pumps, new compressors, open-ended valves, and sampling connections, the proposed standard would require certain equipment. The proposed standard includes provisions to assure the proper operation and maintenance of the equipment and, thus, focuses on detecting equipment failures and requiring their repair.

The proposed standard for safety/relief valves in gas/vapor service would require no detectable emissions except during overpressure releases. Emissions during over-pressure releases do not result from equipment failures, because the function of safety/relief valves is to discharge process fluid to reduce dangerous high pressures within the process. The proposed standard would require a return to no detectable

emissions within five days of an emergency episode.

The proposed standard for product accumulator vessels would require no detectable emissions. This requirement could be achieved by properly installing and maintaining a closed vent system to convey the emissions to a convenient but acceptance portion of the process/operation, to a plant fuel-gas sytem connected to a boiler furnace, or to a control device. A closed vent system that is properly installed and maintained will not allow emissions to occur. Therefore, emissions from equipment failures should not occur.

The proposed standard would require control devices to meet certain design requirements and to operate when emissions from fugitive sources are vented to them. Properly designed and operated control devices would not result in control equipment failures that would result in emissions. For example, emissions from new pump or compressor barrier fluid systems can be vented manually to a control device. The emissions, therefore, can be vented when the control device is operating, thus eliminating these emissions during control equipment failures. Increased emissions during control equipment failures should not occur with this requirement because emissions vented to control devices can be regulated so that the device is operating when emissions are vented. Therefore, dual control systems would not be needed to comply with this requirement.

In summary, it was not necessary to consider additional control techniques for reducing emissions during equipment failures because the proposed standard already contains provisions for handling these emissions. During control equipment failures, fugitive emissions collected by closed vent systems can be vented to a control device when it is operating.

Selection of Recordkeeping and Reporting Requirements

Recordkeeping.—Three recordkeeping alternatives were considered in evaluating the amount of recorded information needed to assess compliance with the proposed standard.

The first alternative would be to require no formal recordkeeping. If recorded documentation of the proposed leak detection and repair program were not required, no mechanism would be provided for checking the thoroughness of the industry's efforts to reduce fugitive emissions effectively. Because the effectiveness of the leak detection and repair program is dependent upon the thoroughness of the industry's efforts, this alternative was not chosen as the basis of the recordkeeping requirements.

The second alternative would require recordkeeping to document results of the leak detection and repair program and information relating to equipment specifications. Information would be recorded in sufficient detail to enable owners or operators to demonstrate compliance with the standard and, therefore, provide reasonable assurance of adequate reduction of fugitive emissions. This alternative would require the maintenance of quantitative records of repaired and unrepaired leaking components. This alternative would require only the minimum amount of records of the work practice leak detection and repair program necessary to ensure the effective implementation of the proposed standard.

The third alternative would require recordkeeping of all the information generated by the proposed standard. This information would include, for example, the leak rate (ppm) detected for all components monitored at a given facility. Much of this information would not be necessary to ensure the implementation of the proposed standard.

The second alternative was selected as the basis for the recordkeeping requirements of the proposed standard. This alternative would require the minimum industry resources for providing the necessary records to ensure effective implementation of the proposed standard. This alternative would also provide a basis for efficient reporting.

Specific information pertaining to the leak detection and repair would be recorded. Each source found to be leaking during the first month of a quarter would be identified with readily visible weatherproof identification bearing an I.D. number. The identification could be removed after the source had been repaired and monitored for leaks and repaired as necessary for the next two successive months. A log would be maintained for information pertaining to the leaking sources. The log would contain the instrument and operator identification numbers, the leaking source identification number, the date of detection of the leaking source, the date of the first attempt to repair the leaking source, repair methods applied in the first attempt to repair the source, and the date of final repair. The log would be kept for two years following the survey.

If the leaking component could not be repaired within 15 days, the reasons for unsuccessful repair and the date of anticipated successful repair would be recorded on the leak report form. Once the leaking source was successfully repaired, the date of repair would be recorded on the leak report form. These records would be needed to provide the information necessary to allow enforcement personnel to assess compliance with the work practice standards.

For equipment specifications, records would be maintained of the dates of installation, start-up, control equipment repair, and control equipment modifications. The dates and descriptions of any control equipment failures would also be recorded. These records would be needed to provide information necessary to allow enforcement personnel to assess the effectiveness of implementation and maintenance of equipment standards.

For design standards, records would be maintained of the location and type of equipment to which the standard applies. As an example, if a boiler furnace is used as a benzene emission control device, then the design fuel and air usage rates, the firebox volume, the average firebox temperature and other design specifications would be recorded.

Reporting.—Three alternatives were considered in evaluating the reporting information needed to assess compliance with the proposed standard. These alternatives represent varying levels of enforcement monitoring of the proposed standard. Enforcement personnel would review the reports submitted by industry personnel on the status of implementing the proposed standard. This review procedure reduces the need for in-plant inspections.

The first alternative would include an affidavit testifying that all specified equipment had been installed, that all components had been monitored, and that those with leaks in excess of the action level had been repaired. These requirements would provide less than the minimum information necessary to monitor compliance with the proposed standard. This alternative would not ensure that fugitive emission reductions had been achieved and would not provide a mechanism for checking the thoroughness of the industry's efforts to reduce these emissions. Thus, compliance with the proposed standard would be assessed mainly through in-plant inspections.

The second reporting alternative would require the submittal of information in sufficient detail to ensure the implementation and maintenance of emission and operational standards and of the specified equipment and the leak detection and repair programs as required by the proposed standard. These requirements would stipulate the

submittal of quarterly reports. Included in the reports would be a summary of information on the leaking components which had been detected during the quarter. This requirement would provide enforcement personnel with an overview of the repair of leaking components. A statement signed by the plant owner or operator attesting to the validity of the results of the monitoring surveys and instrument calibration procedures would allow enforcement personnel to assess the compliance of facilities with the work practice standards. The report would also attest to the proper application and operation of the equipment required by the proposed standard.

The third reporting alternative would require the submittal of all the information obtained while conducting leak detection and repair programs. This information would include the information reported in the second alternative and, additionally, comprehensive information on all tested components. This reporting alternative would necessitate the reporting of all information included in the recordkeeping requirements and would require more resources than the second alternative.

The second alternative was selected as the reporting rquirement for the proposed standard. This alternative provides sufficient information to review compliance without requiring excessive resources from industry and enforcement personnel. The first alternative was not selected because the compliance with work practice standards and the implementation of equipment standards could not be adequately assessed by enforcement personnel to ensure that reductions in fugitive emissions were achieved. The third reporting alternative was not selected because the additional resources expended by industry and enforcement personnel would not facilitate assessment of compliance with emission, operational, and work practice standards and implementation of equipment standards.

In the proposed standard, quarterly reporting of information pertaining to leaking sources detected but not repaired within 15 days of detection would be required. The necessary information would include the location, I.D. number, reasons for unsuccessful repair and the expected date when repair would be accomplished. The date of successful repair after 15 days of initial detection of the leak would also be reported. In addition, the owner or operator would submit a signed statement with the report certifying that compliance with the requirements has been met. One signed statement would be sufficient to cover all process units at the plant.

Equivalence of Alternative Means of Emission Limitation

Under the provisions of Section 112(e) of the Clean Air Act, if the Administrator establishes work practices, equipment, design or operational standards, then the Administrator must allow the use of alternative means of emission limitations if they achieve a reduction in air pollutants equivalent to that achieved under requirements of a standard of performance. Sufficient data would be required to show equivalency, and a public hearing would be required.

Individual owners or operators could request alternatives for specific requirements, such as the proposed equipment and the proposed leak detection and repair program. Sufficient information would have to be collected by a plant to demonstrate that the alternative control techniques would be equivalent to the control techniques required by the proposed standard. This information would then be submitted to EPA in a request for a determination of equivalence. A public hearing notice would be published in the **Federal Register.**

The data submitted in a request for equivalency of alternative control measures would take the form of test data to substantiate equivalency. To obtain permission to use alternate types of equipment, emission test data would be supplied for comparison to emission data from the specified equipment. Application for equivalence of alternative work practices would require submission of twelve months' data for the leak detection and repair program specified in the proposed standard and data for the alternate system. Based on the data collected for at least one year, an alternative work practice would then be set to take the place of the required work practice.

After public notice and opportunity for public hearing, the Administrator would determine the equivalence of an alternative means of emission limitation and would publish his determination in the **Federal Register.**

Impacts of Reporting Requirements

In addition to requirements of the General Provision of Subpart A of 40 CFR Part 61, the proposed standard would require quarterly reports including information pertaining to the required work practices. Estimates of the efforts associated with the reporting requirements indicate that the industry would incur manpower expenditures of approximately 20 man-years in 1985 to fulfill the requirements. No overlapping data requirements with other government agencies are anticipated.

Selection of Test Method

Several fugitive emission measurement and monitoring methods were identified and analyzed in the development of the proposed standard. Evaluation of these alternative methods was based upon results of emission testing conducted at petroleum refineries and organic chemical manufacturing plant.

One method of emission measurement is the direct measurement of leak rates from each source. Direct measurement of leak rate refers to the determination of mass emissions. For the wide variety of sources subject to the proposed standard, direct measurement would require "bagging" techniques for the determination of mass emissions from each source on a kg/hr basis. "Bagging" means to enclose a fugitive emission source with a shroud in order to capture all of the emissions from the source. The shroud must be attached securely to the source in order to ensure complete capture of emissions, and a flow measurement device is needed to measure the volumetric emission rate. After an appropriate equilibration time (5 to 30 minutes), depending on the shroud and the leak rate, a sample of the effluent from the shroud is taken to determine the organic compound concentration. The mass emission rate is then calculated based on the volume flow rate and concentration. Because of the large numbers of sources in a plant, direct measurements of leak rates would be costly, time-consuming, and impractical for routine testing. Therefore, direct measurement of leak rates was not selected as the emission measurement method for the proposed standard.

Indirect emission measurement methods or monitoring methods that would yield qualitative indications of leaks were reviewed. These monitoring methods are (1) a periodic individual component survey that would monitor all fugitive emission sources using portable detectors; (2) a periodic area, or walkthrough, survey that would monitor background concentrations of organic compounds using portable detectors; and (3) a continuous fixed-point monitoring system that would consist of stationary sensing devices with a remotely located central readout or a central analyzer system (gas chromatograph) with remotely collected samples.

Individual component surveys using portable detectors would be the most efficient method for detecting all leaks. The periodic individual component survey could be performed in a reasonable amount of time by monitoring personnel and could be accomplished with relative ease. The cost of a leak detector for the individual component survey would be reasonable.

Two individual component survey methods were identified: (1) leak detection by spraying each component with a soap solution and observing bubble formation; and (2) leak detection by measuring organic compound concentration with a portable detector. The magnitude of leak rates based on bubble formation is difficult to assess. In addition, bubble formation is subject to component temperature and component configuration restraints. Monitoring with a portable detector reduces the amount of variability in the measurement method. There is still some variability induced by this method, however, because of such uncontrollable factors as operator diligence and training. The portable detector is a good method for determining the number of leaks from a source. However, the correlation between emission rate and number of leaks is marginal. Therefore, for regulatory purposes, the portable detector is not suitable for quantifying the emission rate for each source. For these reasons, measurement of organic compound concentration with a portable detector was selected as the method for monitoring individual components.

A periodic area, or walkthrough, survey of background organic compound concentrations with a portable detector and recorder would be a less effective method for detecting leaks than the individual component survey. Interference due to local meteorological conditions and leaks from adjacent units would probably prevent the detection of all leaks within a process unit. In fact, experience has indicated that the area survey is suitable only for locating large leaks. In order to design a walkthrough method that is as sensitive to leaks as an individual component survey, the "action level" indicating the need to survey equipment within a specific area would need to be very low. In addition, the action level would need to be unit- and meteorology-specific (different action levels for different wind speeds). With an action level this low, the background level of organic compound concentration measured could cause considerable interference. Furthermore, leaks would be indicated almost everywhere within the unit. In many cases, an individual component survey would be necessary to locate the actual leaks. Therefore, since it is not possible to provide an industry-wide action level indicative of leaks for a given process unit, and since any action level that was determined could give so many false indications of leaks that a complete individual component survey would be necessary to detect the actual leaks, a walkthrough survey was not judged to be a reasonable approach for leak detection.

Implementation of a continuous fixed-point minitoring system would require a portable detector to locate specific leaking components in addition to multiple stationary monitors or sample collectors. This system would also be a less efficient method for detecting emissions. Possible meteorological interference and problems with measuring concentrations of remotely collected samples would prevent efficient leak detection by a fixed-point system. Except for possible monitoring equipment calibration problems, the fixed-point system would be operated with relative ease by monitoring personnel, who would still be required to use portable detectors to find the individual leaking components indicated by the fixed-point monitoring system. Implementation of a continuous fixed-point monitoring system would be capital-intensive, although labor costs would probably be the least of the three monitoring methods.

Some characteristics of the three indirect emission measurement methods are similar, including safety considerations and ease of operation for monitoring personnel. Some aspects of the three methods are different. Capital and operating costs vary, as do the efficiencies of the methods in detecting leaks. The component method is characterized by a superior leak detection efficiency and reasonable costs; other aspects of the method, including safety and ease of operation, are similar to those of the walkthrough and fixed-point methods. Therefore, the individual component survey was selected as the monitoring method for the standard. Reference Method 21 is being proposed under 40 CFR Part 60, Appendix A and uses the individual component survey monitoring method and, thus, is the method being recommended for the proposed standard.

Selected Test Procedure—The recommended test method would incorporate the use of a portable detector to measure the concentration of volatile organic vapors at a source to yield a qualitative or semiquantitative indication of the emission rate from the source. The test procedure does not detect benzene specifically; instead, the volatile organic compound concentration is measured. There is commercially available one type of portable detector that has the capability of measuring benzene by chromatographic techniques. However, the addition of the requirement that benzene be measured specifically would require more time and more extensive testing support. Measurement of benzene would not yield additional information, since the designated sources are those in which benzene is transported; and a measure of organic vapor leakage is indicative of a benzene leak.

Tests in petroleum refineries have established concentrations versus mass emission relationships for various fugitive emission sources. Also, tests have indicated that local conditions cause variations in concentration readings at points removed from the surface of the interface on the component where leaking occurs. Therefore, the proposed standard would require the concentration to be measured at the interface surface.

The proposed standard would require periodic monitoring for certain fugitive emission sources, including in-line process valves. These valves would include control, globe, gate, plug, and ball valves in benzene service. For monitoring of these valves, the instrument detector probe would be placed at the interface where the stem exits the packing gland (or O-ring seal). The valve stem circumference would be monitored, and special emphasis would be placed on positioning the probe inlet at the local upwind and downwind side of the stem. If the maximum observed concentration is greater than 10,000 ppm above background, leak would be detected. Monitoring is similar for pumps and compressors.

Additionally, the proposed standard would require that safety/relief valves and product accumulator vessels comply with a no detectable emissions limit. A concentration for no detectable emissions needs to be defined such that when emissions occur they can be detected and when emissions do not occur they are not mistakenly detected. Based on considerations with the calibration procedures and monitor variability, 2 percent of the definition of a leak was selected as the definition of no detectable emissions. Thus, in this case, no detectable emissions means less than 200 ppm above background concentration at the leak interface. To determine compliance with this emission limit for safety/relief valves

and product accumulator vessels, the background concentration around each source would first be determined by moving the probe inlet randomly upwind and downwind of the source at a distance of 1 to 2 meters from the source. If an interference exists due to a nearby emission or leak, then the background concentration could be determined at a distance closer to the source; however, this distance could not be less than 25 centimeters from the source. The background concentration would then be noted and the probe inlet would be moved to the surface of the source to conduct the survey.

For safety/relief valves equipped with a rupture disk, the probe inlet would be placed at approximately the center of the exhaust area, or horn. If the observed concentration is greater than 200 ppm above background concentration, a leak would be detected. The sampling would be repeated after each discharge of the valve to verify that the valve has been returned to a state of no detectable emissions.

For safety/relief valves vented to a flare and for accumulator vessels vented to a closed vent system, compliance would be determined by visual inspection and an initial survey of all piping connections prior to the flare or control device. The visual inspection would verify the existence of the required ducting and control device and that there are no sources where emissions could be vented to the atmosphere prior to the control device. The initial sampling survey would verify that there are no detectable emissions from any of the piping connections between the source and the control device. The sampling survey would be repeated after any maintenance work requiring the opening of any piping connections in the closed vent system.

The VOC detector used in the proposed monitoring program would be required to conform to several specifications to ensure consistent industry-wide monitoring, effective VOC emission reduction efforts, and safe leak detection programs. These equipment specifications are as follows: (1) the instrument should respond to total hydrocarbons or combustible gases. Detector types which may meet this requirement include catalytic oxidation, flame ionization, infrared absorption, and photoionization; (2) the instrument should be safe for operation in explosive atmospheres; (3) the instrument should incorporate an appropriate range or dilution option so that concentration levels of 10,000 ppm above background can be measured; (4) the instrument should be equipped with a pump so that a continuous sample can be provided to the detector. The nominal sample flow rate should be 1 to 3 liters per minute; (5) the scale of the instrument readout meter should be readable to ±5 percent at 10,000 ppm above background.

The monitoring instrument would be calibrated before each monitoring survey with methane. Thus, the required calibration gases would be a zero gas (air, <3 ppm VOC) and a methane-air mixture (approximately 10,000 ppm methane). If cylinder calibration gas mixtures would be used, they would have to be analyzed and certified by the manufacturer to within ±2 percent accuracy. Calibration gases prepared by the user according to an accepted gaseous standards preparation procedure would also have to be accurate within ±2 percent.

The monitoring instrument would be subjected to other performance requirements prior to being placed in service for the first time. The instrument would be subjected to the performance criteria every six months and after any modification or replacement of the instrument detector.

The proposed standard also requires that ASTM Method D2267–68 ("Aromatics in Light Naphthas in Aviation Gasoline by Gas Chromatography") be used to determine the percent benzene in the process fluid within a fugitive emission source. This determination would be made only when the exact concentration of benzene is uncertain.

Public Hearing

A public hearing will be held to discuss the proposed standard for benzene fugitive emissions in accordance with Section 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations on the proposed standard for benzene fugitive emissions should contact EPA at the address given in the ADDRESSES section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement before, during, or within 30 days after the hearing. Written statements should be addressed to the Central Docket Section address given in the ADDRESSES section of this preamble and should refer to docket number A–79–27.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at EPA's Central Docket Section in Washington, D.C. (see ADDRESSES section of this preamble).

Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered by EPA in the development of this proposed rulemaking. The principal purposes of the docket are (1) to allow members of the public and industries involved to identify and locate documents so they can intelligently and effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review.

Miscellaneous

In accordance with Section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. In addition, members of the benzene task group of the Interagency Regulatory Liaison Group, representing EPA, OSHA, the Food and Drug Administration, and the Consumer Product Safety Commission, have met and reviewed the proposed standard to ensure that the statement of the rule is jointly understood and is consistent with their programs. The Administrator will welcome comments on all aspects of the proposed regulations, including economic and technological issues, and on the proposed test method.

This regulation will be reviewed five years from the date of promulgation. This review will include an assessment of such factors as the need for integration with other programs, the existence of alternative methods, enforceability, improvements in emission control technology, and the reporting requirements. The reporting requirements in this regulation will be reviewed as required under the EPA sunset policy for reporting requirements in regulations.

Dated: December 18, 1980.

Douglas M. Costle,

Administrator.

It is proposed to amend 40 CFR Part 61 by adding Subpart J as follows:

Subpart J—National Emission Standard for Benzene Fugitive Emissions

Sec.

61.110 Applicability and designation of sources.
61.111 Definitions.
61.112 Standard for new and existing sources.
61.113 Alternative standard.
61.114 Equivalence of alternative means of emission limitation.
61.115 Test methods and procedures.
61.116 Recordkeeping requirements.
61.117 Reporting requirements.

Authority: Section 112, 301(a) of the Clean Air Act, as amended, (42 U.S.C. 7411, 7601(a)), and additional authority as noted below.

Subpart J—National Emission Standard for Benzene

§ 61.110 Applicability and designation of sources.

(a) The provisions of this subpart apply to each of the following designated sources that are intended to operate in benzene service: pumps, compressors, pipeline valves, safety/relief valves, sampling systems, open-ended valves, pipeline flanges, and product accumulator vessels. The provisions of this subpart do not apply to coke oven by-product plants.

(b) While the provisions of this subpart are effective, a designated source that is also subject to the provisions of 40 CFR Part 60 shall only be required to comply with the provisions of this subpart.

§ 61.111 Definitions.

As used in this subpart, all terms not defined here shall have the meaning given them in the Act and in subpart A of Part 61, and the following terms shall have the specific meanings given them:

"In Benzene Service" means that the fugitive emission source either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight benzene.

"Closed Vent System" means a system that is not open to atmosphere and is a combination of piping, connections and, if necessary, flow-inducing devices that transports gas or vapor from a fugitive emission source to an enclosed combustion device or vapor recovery system.

"Enclosed Combustion Device" means any combustion device that is not open to atmosphere, such as a process heater or furance, but not a flare.

"First Attempt at Repair" means to take action for the purpose of stopping or reducing leakage of organic material to atmosphere using best modern practices.

"Fixed Capital Cost" means the capital needed to provide all the depreciable components.

"Fugitive Emission Source" means each pump, pipeline valve, safety/relief valve, open-ended valve, flange or other connector, compressor, product accumulator vessel, or sampling system.

"In Gas/Vapor Service" means that the fugitive emission source contains process fluid that is in the gaseous state at operating conditions.

"Open-Ended Valve" means any valve, except safety/relief valves, with one side of the valve seat in contact with process fluid and one side open to atmosphere, either directly or through open piping.

"Pipeline Valve" means the stem packing and collar seat of any externally actuated device that has a stem that extends into the process fluid and is used to regulate the flow of liquids or gases through a pipe.

"Process Unit" means equipment assembled to produce benzene or benzene derivatives as intermediates or final products, or equipment that uses benzene in the production of a final product.

"Product Accumulator Vessel" means any distillate receiver, bottoms receiver, surge control vessel, or product separator in benzene service that is vented to atmosphere either directly or through a vacuum-producing system. A product accumulator vessel is in benzene service if the liquid or the vapor in the vessel is at least 10 percent by weight benzene.

"Reconstruction" means the replacement of components of an existing source to such an extent that:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable, entirely new source; and

(2) It is feasible, considering economic impacts and the technological problems associated with retrofit, to meet the applicable standard for new sources set forth in this subpart.

"Repaired" means that a fugitive emission source is adjusted or otherwise altered in order to reduce fugitive emissions below the level which indicates the necessity for repair as required in § 61.112.

"In Vacuum Service" means that the fugitive emission source is operating at internal pressures that are continously less than 100 kPa.

"Vapor Recovery System" means any type of control device capable of capturing benzene vapor from a gas stream, such as carbon adsorption, vapor compression and vapor refrigeration systems.

§ 61.112 Standard for new and existing sources.

Each owner or operator subject to the provisions of this subpart shall comply with the following requirements for fugitive emission sources in benzene service, execpt those in vacuum service:

(a) New pumps and compressors.

(1) Each new pump shall be equipped with a dual mechanical seal system that includes a barrier fluid between the seals, except as provided in §§ 61.112(a)(7), 61.112(a)(8), and 61.112(i). Each new compressor shall be equipped with a seal system that includes a barrier fluid and that prevents leakage of process fluid to atmosphere, except as provided in §§ 61.112(a)(7), 61.112(a)(8), and 61.112(i). Benzene concentration in the barrier fluid shall be maintained below 10 percent by weight at all times.

(2) Each system as required in § 61.112(a)(1) shall be equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both.

(3) Each sensor as required in § 61.112(a)(2) shall be checked daily or shall be equipped with an audible alarm. Based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both shall be determined for each dual mechanical seal system. If this criterion is registered by the sensor, a leak is detected.

(4) Each pump shall be checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seal. If indications of liquids dripping from the pump seal are observed, a leak is detected.

(5) When leak is detected, it shall be repaired as soon as is practicable, but no later that 15 calendar days after the leak is deteced. A first attempt at repair shall be made no later than five calendar days after each leak is detected.

(6) Each dual mechanical seal system as required in § 61.112(a)(1) shall be—

(i) Operated with the barrier fluid at a pressure that is greater at all times than the pump stuffing box pressure,

(ii) Equipped with a barrier fluid degassing reservoir that is connected by a closed vent system to an enclosed combustion device designed for a minimum residence time of 0.50 seconds at 760°C or to a vapor recovery system designed for a minimum of 95 percent capture of benzene input to the vapor recovery system, or

(iii) Designed and operated so that no benzene can be emitted to atmosphere when barrier fluid purging is required.

(7) Any new pump or compressor that is not equipped with the requirements of § 61.112(a)(1) shall be equipped with a closed vent system capable of transporting all leakage from the seal to an enclosed combustion device designed to provide a minimum residence time of 0.50 seconds at a minimum temperature of 760°C or to a vapor recovery system designed for a minimum of 95 percent capture of benzene input to the system. Closed vent systems, enclosed combustion devices, and vapor recovery systems used to comply with this requirement shall be operated at all times when benzene emissions may occur.

(8) Any new pump or compressor that is designated as required in § 61.116(d)(1) for emissions having a concentration of less than 200 parts per million (ppm) by volume above background, as determined by the methods specified in § 61.115(b), is exempt from the requirements of § 61.112(a)(1)–(7) if the pump—

(i) Has no externally actuated shaft penetrating the pump housing,

(ii) Is operated with emissions less that 200 ppm above background as determined by the methods specified in § 61.115(b), and

(iii) Is tested for compliance with § 61.112(a)(8)(ii) annually and at the request of the Administrator.

(9) Closed vent systems, enclosed combustion devices, and vapor recovery systems used to comply with §§ 61.112(a)(6) (ii) and (iii) shall be operated at all times when benzene from the barrier fluid degassing reservoir may occur.

(b) Safety/relief valves in gas/vapor service.

(1) Each safety/relief valve in gas/vapor service shall be operated at a state of emissions having a concentration of less than 200 ppm above background, as determined by the methods specified in § 61.115(b), except during pressure releases.

(2) Each safety/relief valve shall be returned to a state of emissions having a concentration of less than 200 ppm above background after each pressure release as soon as is practicable, but no later than five calendar days, after each pressure release.

(c) Sampling systems.

(1) Each sampling system shall be equipped with a closed purge system.

(2) Each closed purge system as required by § 61.112(c)(1) shall return the purged process fluid directly to the process line, or shall collect the purged process fluid for recycle or disposal without benzene emissions to atmosphere.

(3) *In-situ* sampling systems are exempt from §§ 61.112(c) (1) and (2).

(d) Pipeline valves, open-ended valves, and existing pumps and compressors.

(1) Each pipeline valve, existing pump, and existing compressor shall be monitored monthly to detect leaks by the methods specified in § 61.115(a). If a concentration greater than or equal to 10,000 ppm above background is measured, a leak is detected.

(2) When a leak is detected, it shall be repaired as soon as is practicable, but no later than 15 days after it is detected except as provided in § 61.112(g). A first attempt at repair of the designated source shall be made no later than five calendar days after each leak is detected.

(3) First attempts at repair for pipeline valves should include, but are not limited to, the following procedures, if practicable:

(i) Tightening of bonnet bolts.

(ii) Replacement of bonnet bolts.

(iii) Tightening of packing gland nuts.

(iv) Injection of lubricant into lubricated packing.

(4) Any pipeline valve for which a leak is not detected for two successive months may be monitored during the first month of every quarter beginning with the next quarter by the methods specified in § 61.115(a) until a leak is detected. If a leak is detected, the valve shall be monitored monthly until a leak is not detected for two successive months.

(5) Any pipeline valve, existing pump, or existing compressor that is designated as required in § 61.116(d)(1) for emissions having a concentration less than 200 ppm above background, as determined by the methods specified in § 61.115(b), is exempt from the requirements of §§ 61.112 (d) (1)–(4) if it—

(i) Has no external actuating mechanism in contact with the process fluid,

(ii) Is operated with emissions having a concentration less than 200 ppm above background, as determined by the methods specified in § 61.115(b), and

(iii) Is tested for compliance with § 61.112(d)(5)(ii) annually and at the request of the Administrator.

(6) Each open-ended valve shall be equipped with a cap, blind, plug, or a closed second valve that is attached to seal the open end at all times except during operations requiring flow through the open-ended valve.

(7) Each open-ended valve equipped with a second valve, as required in § 61.112(d)(6), shall be operated such that the open-ended valve is completely closed before the second valve is closed.

(8) Any existing pump or existing compressor that is designated as required in § 61.116(d)(1) for compliance with the new pump or compressor requirements in § 61.112(a) is exempt from the requirements of § 61.112(d). These existing pumps and compressors shall comply with the requirements of § 61.112(a).

(9) Each pump shall be checked by visual inspection each calendar week for indications of liquids dripping from the pump seal. If indications of liquids dripping from the pump seal are observed, a leak is detected.

(e) Product accumulator vessels.

(1) Each product accumulator vessel shall be operated at a state of emissions having a concentration less than 200 ppm above background, as measured by the methods specified in § 61.115(b)

(2 Product accumulator vessels that are used in the production of ethylbenzene or styrene are exemped from § 61.112(e)(1).

(3) Closed vent systems used to achieve compliance with § 61.112(e)(1) shall be designed to transport emissions from the product accumulator vessel to either an enclosed combustion device designed to provide a minimum residence time of 0.50 seconds at a minimum temperature of 760°C or to a vapor recovery system designed for a minimum of 95 percent capture of benzene input to the system. Closed vent systems, enclosed combustion devices, and vapor recovery systems used to comply with the requirement specified in § 61.112(e)(1) shall be operated at all times when benzene emissions may occur.

(f) Other fugitive emission sources.

(1) Fugitive emission sources in benzene service that are not covered in §§ 61.112 (a)–(e) of this subpart, such as safety/relief valves in liquid service and pipeline flanges or other connectors, shall be monitored to detect leaks by the methods specified in § 61.115(a) as soon as practicable, but no later than five calendar days, after leakage is detected by visual, audible, olfactory, or any other method.

(2) If a concentration greater than or equal to 10,000 ppm above background is measured, a leak is detected.

(3) If a leak is detected, it shall be repaired as soon as is practicable, but no later than 15 calendar days after the leak is detected, except as provided in § 61.112(g) of this subpart. A first attempt at repair shall be made within five calendar days after each leak is detected.

(g) Delay of repair of fugitive emission sources for which leaks have been detected will be allowed only if repair is technically infeasible without a complete or partial process unit shutdown. Delay of repair will not be allowed beyond a process unit shutdown.

(h) Each designated source shall be marked in such a manner that will be readily obvious to both plant and enforcement personnel.

(i) A determination of equivalence of alternative means of emission limitation to the requirements of §§ 61.112(a), (c), (d), and (f) may be requested as provided in § 61.114. If the Administrator determines that an alternative means of emission limitation is at least equivalent to the requirements of §§ 61.112(a), (c), (d), and (f), the

requirements of that determination shall apply.

(j) Upon reconstruction, an existing source shall become a new source for the purposes of this subpart.

(k) Compliance with §§ 61.112 (a)–(j) shall be determined by review of records and inspection. Compliance with §§ 61.112(a)(8), (b), (d)(5), and (e) shall be determined by the methods specified in § 61.115(b).

§ 61.113 Alternative standard.

(a) Pipeline valves in benzene service—allowable percentage of leaking valves.

(1) After performing a monthly leak detection and repair program in accordance with §§ 61.112(d) (1)–(5) for at least 12 months, an owner or operator may request approval from the Administrator to comply with an allowable percentage of leaking pipeline valves in benzene service.

(2) The following requirements shall be met if an owner or operator wishes to comply with an allowable percentage of leaking pipeline valves:

(i) An owner or operator must request approval of the Administrator to comply with an allowable percentage of leaking valves.

(ii) An owner or operator must have performed a monthly leak detection and repair program in accordance with §§ 61.112(d) (1)–(5) for at least 12 months before a request for approval is submitted.

(iii) A request for approval of an allowable percentage of leaking valves musts be accompanied by data and calculations which describe the methodology used for determining the allowable percentage of leaking valves.

(iv) A performance test as specified in § 61.113(a)(4) shall be conducted annually and at the request of the Administrator. A written report of the results of the performance test shall be submitted to the Administrator within a time interval specified by the Administrator.

(v) If a valve leak is detected, an attempt must be made to repair it.

(3) The allowable percentage of leaking valves shall be determined by adding the monthly baseline percentage of leaking valves demonstrated during the last six months under monthly monitoring and the monthly incremental percentage of leaking valves which would have occurred if the provisions of § 61.112(d)(4) had been followed.

(i) The monthly baseline percentage of leaking valves shall be determined by obtaining a monthly average of the percentage of leaking valves found in an affected process unit during the last six months of operation under monthly monitoring.

(ii) The monthly incremental percentage of leaking valves shall be determined by averaging the percentage of valves for which leaks had been detected in the second and third months of the last two quarters but which had not been detected during the first months of the last two quarters.

(iii) A percentage of leaking valves shall be determined by dividing the total number of leaking valves by the total number of valves in an affected process unit, excluding those leaking valves for which repair has been delayed because a process unit shutdown would be required as provided in § 61.112(g) and those valves which are complying with the provisions of § 61.112(d)(5).

(4) Performance tests shall be conducted in the following manner:

(i) All valves within the affected process unit shall be monitored by the methods specified in § 61.115(a).

(ii) If a VOC concentration of 10,000 ppm or greater is measured, a leak is detected.

(iii) The leak percentage shall be determined by dividing the number of valves for which leaks are detected by the number of valves within the affected process unit, excluding valves for which repair has been delayed because a process unit shutdown would be required, and those which are complying with the provisions of § 61.112(d)(5).

(iv) For those valves for which repair has been delayed because a process unit shutdown would be required, records of attempted repair must be provided at the request of the Administrator. Records of attempted repair for those valves for which repair has been delayed shall be kept for two years.

(5) (i) The Administrator will approve or disapprove this alternative within 90 days of the request for approval.

(ii) If the Administrator denies the use of this alternative, the Administrator will notify the owner or operator of the reasons for the denial.

(iii) If the Administrator is reviewing a request for the use of this alternative as specified in §§ 61.113(a) (1) and (2), the Administrator may request additional information. If the Administrator is reviewing a denial of this alternative, as specified in § 61.113(a)(5)(i), the Administrator may request additional information.

(iv) The owner or operator shall be subject to the requirements of §§ 61.112(d)(1)–(5) until this alternative is approved.

(6) The reporting provisions of §§ 61.117(b)(2)–(6) and (8) would not apply to owners or operators complying with an allowable percentage of leaking valves.

(b) Pipeline valves in benzene service-alternative work practices.

(1) After performing a monthly leak detection and repair program in accordance with §§ 61.112(d)(1)–(5) for at least 12 months, an owner or operator may request approval of the Administrator to comply with an alternative work practice for pipeline valves in benzene service which differs from the work practice required in §§ 61.112(d) (1) and (4).

(2) The following requirements shall be met if an owner or operator wishes to comply with an alternative work practice:

(i) An owner or operator must request approval of the Administrator to comply with an alternative work practice standard.

(ii) An owner or operator must have performed a monthly leak detection and repair program in accordance with §§ 61.112(d)(1)–(5) for 12 months before a request for approval is submitted.

(iii) A request for approval of an alternative work practice standard must be accompanied by data and calculations showing that the alternative work practice complies with the requirements of § 61.113(b)(3).

. (3) The alternative work practice program shall be designed to accomplish the emission reduction associated with the required program in §§ 61.112(d)(1)–(5). To demonstrate this reduction, an owner or operator shall determine the leak occurrence and recurrence for each program. These data shall be used to show that the expected percentage of leaking valves in the affected process unit under the alternative program is equal to or less than the expected percentage of leaking valves under the required program.

(4)(i) The Administrator will approve or disapprove this alternative within 90 days of the request for approval.

(ii) If the Administrator denies the use of this alternative work practice, the Administrator will notify the owner or operator of the reasons for the denial.

(iii) If the Administrator is reviewing a request for the use of this alternative work practice as specified in §§ 61.113(b) (1) and (2), the Administrator may request additional information. If the Administrator is reviewing a denial of this alternative work practice, as specified in § 61.113(b)(4)(i), the Administrator may request additional information.

(iv) The owner or operator shall be subject to the requirements of §§61.112(d)(1)–(5) until this alternative is approved.

§ 61.114 Equivalence of alternative means of emission limitation.

(a) Each owner or operator subject to the provisions of this subpart may apply to the Administrator for determination of equivalence for any alternative means of emission limitation that achieves a reduction in emissions of benzene at least equivalent to the reduction in emissions of benzene of the controls required in §61.112.

(b) Determination of equvalence to the equipment requirements in §§ 61.112 (a), (c), and (d) will be evaluated by the following guidelines:

(1) Each owner or operator apply for an equivalence determination shall be responsible for collecting and verifying test data to demonstrate equivalence of an alternative means of emission limitation to the requirements of §§ 61.112 (a), (c), and (d).

(2) The Administrator will compare test data for the alternative means of emission limitation to test data for the specific equipment requirement.

(3) The Administrator may condition approval of equivalency on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the equipment requirements of §§ 61.112 (a), (c), and (d).

(c) Determination of equivalence to the work practices required in § 61.112(d) will be evaluated by the following guidelines:

(1) Each owner or operator applying for an equivalence determination shall be responsible for collecting and verifying test data to demonstrate equivalence of an alternative means of emission limitation to the requirements of § 61.112(d).

(2) For designated sources for which a determination of equivalence is requested, the emission reduction achieved by the requirements of § 61.112(d) shall be demonstrated for a minimum period of 12 months. A quantitative performance level shall be determined that describes the emission reduction achieved by the requirements of § 61.112(d).

(3) For these designated sources, the emission reduction achieved by any alternative means of emission limitation shall be demonstrated.

(4) Each owner or operator applying for a determination of equivalence shall commit to compliance with a performance that provides for emission reductions equal to or greater than the emission reductions achievable by the requirements of § 61.112(d).

(5) The Administrator will compare the demonstrated emission reduction for the alternative means of emission limitation to the demonstrated emission reduction for the work practice requirements of § 61.112(d) and will consider the commitment in § 61.114(c)(4).

(6) The Administrator may condition approval of equivalency on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the requirements of § 61.112(d).

(d) After a request for determination of equivalence is received, the Administrator will publish a notice in the **Federal Register** and provide the opportunity for public hearing. After notice and opportunity for public hearing, the Administrator will determine the equivalence of an alternative means of emission limitation and will publish the determination in the **Federal Register.**

§ 61.115 Test methods and procedures.

Each owner or operator subject to the provisions of this subpart shall comply with the following test method and procedure requirements:

(a) Monitoring as required by § 61.112(d)(1) shall comply with the following requirements:

(1) Monitoring shall comply with 40 CFR Part 60, Appendix A, Reference Method 21.

(2) The detection instrument shall meet the performance criteria of 40 CFR Part 60, Appendix A, Reference Method 21.

(3) The instrument shall be calibrated on the day of its use by the methods specified in 40 CFR Part 60, Appendix A, Reference Method 21.

(4) Calibration gases shall be:

(i) zero air (less than 3 ppm of VOC in air), and

(ii) approximately 10,000 ppm methane in air.

(5) The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible, as described in 40 CFR Part 60, Appendix A, Reference Method 21.

(b) When fugitive emission sources are tested for emissions having a concentration less than 200 ppm above background as required by §§ 61.112 (a), (b), and (d), the testing shall comply with the following requirements:

(1) The requirements of §§ 61.115(a) (1), (2), (3), and (4) shall apply.

(2) If a test for emissions less than 200 ppm above background is requested by the Administrator, then the background level shall be determined and the instrument probe shall be traversed around all potential leak interfaces at the minimum distance possible, as set forth in 40 CFR Part 60, Appendix A, Reference Method 21.

(3) If the difference in the background level and the concentration level measured at all potential leak interfaces is less than 200 ppm, then the emissions are less than 200 ppm above background,

(c) For purposes of determining the percent benzene in the process fluid within a fugitive emission source, procedures that conform to the general methods in ASTM Method D2267–68 shall be used.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

§ 61.116 Recordkeeping requirements.

Each owner or operator subject to the provisions of this subpart shall comply with the following recordkeeping requirements:

(a) When each leak is detected as specified in §§ 61.112 (a), (d), and (f), the following requirements shall apply:

(1) Weatherproof and readily visible identification, marked with the source identification number, shall be attached to the leaking source.

(2) The identification may be removed after the fugitive emission source (except pipeline valves) has been repaired. For pipeline valves, the identification may be removed after it has been monitored for two successive months as specified in § 61.112(d)(4) and no leak has been detected during those two months.

(b) When each leak is detected as specified in §§ 61.112 (a), (d), and (f), the following information shall be recorded in a log and shall be kept for two years in a readily accessible location:

(1) The instrument and operator identification numbers and the source identification number.

(2) The date the leak is detected and the dates of each attempt to repair the leak.

(3) Repair methods applied in each attempt to repair the leak.

(4) Whether the maximum VOC concentration measured by the methods specified in § 61.115(a) after each repair attempt was greater than or less than 10,000 ppm above background.

(5) "Repair delayed" if a leak is not repaired within 15 calendar days after discovery of the leak.

(6) The signature of the owner or operator whose decision it was that repair could not be effected without a process unit shutdown.

(7) the expected date of successful repair of the leak if a leak is not repaired within 15 days.

(8) the date of successful repair of the leak.

(c) The following information pertaining to the design requirements for closed vent systems, enclosed

combustion devices, and vapor recovery systems specified in § 61.112 (a) and (e) shall be recorded and kept in a readily accessible location:

(1) Detailed schematics, design specifications, and piping and instrumentation diagrams.

(2) The dates and descriptions of any changes in the design specifications.

(3) Dates of startups and shutdowns of enclosed combustion devices and vapor recovery systems specified in § 61.112 (a) and (e) and dates when these systems are not functioning as designed.

(d) the following information pertaining to all fugitive emission sources subject to the requirements in §§ 61.112 (a), (b), (d), and (e) shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for fugitive emission sources that are designated for emissions having a concentration less than 200 ppm above background under the provisions of §§ 61.112 (a)(8), (b)(1), (d)(5), and (e)(1) and are designated for compliance with new source requirements under the provisions of § 61.112(d)(8). The designation of these sources as subject to these sections shall be signed by the owner or operator.

(2) the dates of each verification test for emissions having a concentration less than 200 ppm above background.

(3) the background level measured during each verification test as described in § 61.115(b).

(4) the maximum VOC concentration measured at the source during each verification test as described in § 61.115(b).

(e) The following information shall be recorded in a log that is kept in a readily accessible location:

(1) the design criterion required in § 61.112(a)(3).

(2) Any changes to this criterion and the reasons for the change. (Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414).)

§ 61.117 Reporting requirements.

Each owner or operator subject to the provisions of this subpart shall comply with the following reporting requirements:

(a)(1) An owner or operator of any source to which this subpart applies shall submit a statement in writing notifying the Administrator that the requirements of §§ 61.112, 61.116, and 61.117 are being implemented.

(2) In the case of an existing source or a new source which has an initial startup date preceding the effective date, the statement is to be submitted within 90 days of the effective date, unless a waiver of compliance is granted under § 61.11, along with the information required under § 61.10. If a waiver of compliance is granted, the statement is to be submitted on a date scheduled by the Administrator.

(3) In the case of new sources which did not have an initial startup date preceding the effective date, the statement shall be submitted with the application for approval of construction or modification, § 61.07.

(4) the statement is to contain the following information for each designated source:

(i) Fugitive emission source identification number.

(ii) Type of fugitive emission source (i.e., pump, pipeline valve, etc.).

(iii) Percent by weight benzene in the fluid at the fugitive emission source.

(iv) Process fluid state at the fugitive emission source (gas/vapor or liquid).

(v) Method of compliance with the standard (i.e., "equipped with dual mechanical seal system," or "monthly leak detection and repair," etc.).

(b) A report shall be submitted to the Administrator each quarter, starting three months after the initial report required in § 61.117(a), that includes the following information; the format of the report may be similar to that shown in Figures 1, 2, 3, and 4:

(1) Process unit identification.

(2) Nunber of pipeline valves in the process unit excluding those designated for emissions having a concentration less than 200 ppm above background under the provisions of § 61.112(d)(5).

(3) Number of pipeline valves, existing pumps, and existing compressors for which leaks were detected as required in § 61.112(d) during each month of the reporting quarter.

(4) Number of pipeline valves, existing pumps, and existing compressors repaired.

(5) Number of pipeline valves, existing pumps, and existing compressors not repaired within 15 days as required in § 61.112(d)(2).

(6) Reasons for non-repair of valves, existing pumps, and existing compressors within 15 days as required in § 61.112(d)(2).

(7) Number of pumps and compressors for which leaks were detected during the reporting quarter as specified in §§ 61.112(a)(3) and (4).

(8) Statement signed by the owner or operator stating whether all provisions of 40 CFR Part 61 Subpart J had been fulfilled during the reporting quarter.

(c) In the first report submitted as required in § 61.117(b), the report shall include a reporting schedule stating the months that quarterly reports shall be submitted. Subsequent reports shall be submitted according to that schedule, unless a revised schedule has been submitted in a previous quarterly report.

(d) An application for approval of construction or modification, § 61.07, will not be required if—

(1) The existing source has become a new source through reconstruction;

(2) The new source complies with the standard for new sources, § 61.112; and

(3) In the next quarterly report required by § 61.117(b), the information in § 61.117(a)(4) is reported.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414).)

BILLING CODE 6560-01-M

Figure 1

QUARTERLY REPORT FOR PROCESS UNIT
FUGITIVE EMISSION SOURCES OPERATING UNDER THE
PROVISIONS OF 40 CFR Part 61, Subpart J, §61.117(b)

Date _____

Company Name _____

Plant Location (City, State) _____

Mailing Address _____

_____

Telephone Number _____

Reporting Period _____

This report filed _____
(Process Unit Name)

Producing _____
(Chemical Product(s))

EXAMPLE

Figure 2

SUMMARY STATISTICS FOR LEAK DETECTION
AND REPAIR REQUIREMENTS
OF 40 CFR Part 61, Subpart J, §61.117(b)

1. Process Unit Name _____
(one report required for each process unit)
2. Number of valves covered under the leak detection and repair program. _____
3. Number of valves found leaking during the reporting period. _____
4. Number of leaking valves repaired during the reporting period. _____
5. Number of leaking valves detected during the quarter which were not repaired within 15 days. _____
6. Number of pumps found leaking during the reporting period. _____
7. Number of compressors found leaking during the reporting period. _____

EXAMPLE

Figure 3

INFORMATION REQUIRED BY 40 CFR Part 61, Subpart J, §61.112(d)(2)
FOR LEAKING VALVES NOT REPAIRED WITHIN 15 DAYS

1. Process Unit Name_____

2. Number of valves, pumps, and compressors not repaired for the following reasons:

   (a) New parts required. _____

   (b) Off-line repair required. Critical in-service valve. Bypass impossible. _____

   (c) Other (Explain reasons for non-repair) _____

3. Date of next scheduled turn-around or shutdown. _____

_____
Signature of Plant Manager or
Manager Designate

EXAMPLE

Figure 4

CERTIFICATION
AS REQUIRED IN §61.117(b)(8)

I hereby certify that process unit_____ owned (operated)
(Name)
by_____ located in_____
(Company Name) (City, State)
_____ operated in compliance with the requirements of Subpart
(has been/has not been)
J, 40 CFR Part 61 which contains National Emission Standard for Benzene Fugitive Emissions.

All required equipment and control devices have been operated and maintained in compliance with the standard. All required work practices have been followed. Monitoring has been done as specified in Method 21. All required records have been made and are kept in_____
(location in plant)
for review by EPA.

_____
(Signature of owner or operator)

_____
(title)

_____
(date)

EXAMPLE

[FR Doc. 81-90 Filed 1-2-81; 8:45 am]
BILLING CODE 6560-01-C